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Use of the Hester Davis Falls Risk Assessment Scale in Medical-Surgical Patients

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This is to certify that the doctoral study by

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Walden University
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Abstract

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MA/MS, Saint Mary's University of Minnesota, 2017

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Identifying and containing patient falls before they happen, reporting fall occurrence, and analyzing fall causes could increase patient safety to achieve the triple aim of improved quality, reduced cost, and accessibility in healthcare. Patient falls within the medical-surgical population continue to present challenges to patients, families, hospitals, and society, despite the use of fall-related predictive analysis tools. The purpose of this quantitative study was to determine the extent to which the overall score on the Hester Davis Falls Risk Assessment Scale (HDS), comprised of patient-related factors such as medications, volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior variants, predicted the occurrence of patient falls in medical-surgical patients. The study was grounded on the health information technology safety measurement theoretical framework. A quantitative correlational cross-sectional methodology was applied in the study to analyze one year of patient fall data from a safety net hospital in Colorado. The HDS positively predicted ($p \geq .05$) patient fallers in the medical-surgical patient population. Patient-related factors (patient medications, volume/electrolyte status, mobility, toileting needs, communication/sensory needs, mental status, and behavior variants) were found to increase the risk of falls. Positive social change could result from the findings of this study, in that findings could contribute to improved quality of patient care and enhanced decision making by healthcare leaders to reduce patient falls. Fall prevention is critical to reduce patient injuries and the cost of care.

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Dedication

This project is dedicated to all who supported me throughout my studies to achieve my dreams. My mother, Nelia (deceased), who was my first teacher and inspiration. To my children, Christian, Gynelia, and Ella, you understood me and gave me the time needed for my studies. Thank you.

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Section 1: Foundation of the Study and Literature Review

Introduction

Patient falls have been an issue affecting safe healing of patients in hospitals. The causes of falls may be related to an individual's morphological factors such as vision problems, unsteady gait, and weak muscle strength; to environmental factors such as poor lighting, clutter, and lack of assistive aids such as grab bars; or even to medications such as blood pressure medications, sedatives, or antidepressants (Centers for Disease Control and Prevention [CDC], 2018b). One out of five patient falls results in injury to bones and the head, significantly affecting the health of the individual (CDC, 2018b).

Hospitals use fall risk analytical tools during patient admission to evaluate the chance of a patient falling. However, patient fall evaluation tools are universally used across all patient populations without research being done to ascertain their suitability or precision for application to unique patient groups. One of the patient fall risk evaluation tools used in inpatient healthcare is the Hester Davis Falls Risk Assessment Scale (HDS). The HDS uses nine variables to score and project the possibility of a patient fall. The variables contained in the HDS include age, last known fall, mobility, medications, mental status, toileting needs, volume of electrolytes, communication/sensory, and behavior. Despite the wide application and use of the HDS in the medical-surgical patient population, there was no scientific evidence for its effectiveness and appropriateness of application to the medical-surgical patient population. The HDS has only been validated in the neuropathy patient population (HD Nursing, 2019). The positive social change implications of this study are that the rate of patient falls could be improved with the use of a validated fall risk tool.

Problem Statement

Patient falls are among the leading quality and safety issues in U.S. hospitals and have continued to present challenges to patients, families, hospitals, and society. Patient fall cases, which occur in alarming numbers, increase health care costs and compromise patient safety, especially in the medical-surgical patient population. According to the CDC (2020a), millions of people, particularly those who are 65 years and older, experience falls. The high cost of care associated with patient fall injuries, hospital reputational damage, and reimbursement are just some of the fall-related challenges facing healthcare leaders, healthcare organizations, patients, families, and the community at large. One out of four individuals aged 65 years and older reports falling at a health care facility, while other falls may not be reported (CDC, 2020b). If the trend continues, the country can anticipate seven deaths because of patient falls every hour by the year 2030 (CDC, 2020b). Healthcare administrators could improve quality of care by researching and applying appropriate fall prevention detection tools to appropriate patient populations and conditions. Although researchers have investigated the issue of patient falls, there is little or no literature on how the HDS can predict fall incidents in inpatient medical-surgical patients. The medical-surgical patient population was of interest because it had the highest rates of patient falls and fall-related injuries in the Denver Health Hospital.

Purpose

This study was a retrospective development and prospective validation of the HDS. The setting was at Denver Health Hospital, which is an academic medical center in the Central United States within a large metropolitan population and is a Level 1 trauma center. The retrospective analysis sample was based on adults aged 18 years and older admitted to the medical-surgical unit who had been evaluated during admission for falls using the HDS between January 2020 and December 2020.

Patient falls in healthcare, including medical-surgical departments, continue to be of crucial concern (Joint Commission, 2015). Inpatient fall rates range from 1.7 to 25 falls per 1,000 patient days, with an overall risk of falling ranging from 1.9% to 3% (Bouldin et al., 2013). Because falls are such a predominant issue and are critical in the nurse-sensitive metric of performance by the American Nurses Credentialing Center Magnet Recognition Program, the Joint Commission has emphasized the need to reduce fall-related injuries (Graystone, 2019). While it is known that falls can result in serious injuries and even death, this research focused on fall prediction in medical-surgical wards. I sought to determine the validity and reliability of the HDS in precisely predicting a fall in medical-surgical units by examining independent variables that comprise the HDS, which are medications, volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior variants, with the dependent variable of fall.

Having the ability to predict and prevent falls is of fundamental clinical relevance. Accurate prediction of risk is the first step in prevention (Fischer et al., 2016). Without accurate risk prediction, implementation of fall prevention interventions is subjective at best, which jeopardizes any standard care approach for preventing falls and related injuries. With identified predictive risk characteristics, health care leaders may quickly implement prevention interventions (Fischer et al., 2016). Increased use of such strategies could translate into decreased falls and fall-related injuries in medical-surgical units.

The original HDS was validated to predict fall risk in the neurosciences patient population (HD Nursing, 2021). Although the original HDS had been used successfully in other departments, there existed no literature to indicate that the tool had been validated in the medical-surgical population. The characteristics of medical-surgical fallers may differ from those of patients who fall in other hospital units, and in particular in the neuroscience unit. In addition, the HDS is a comprehensive risk assessment tool that drives care planning based on identified risk factors. In the medical-surgical setting, a screening tool can provide more efficient identification of risk that allows for fall prevention safety bundles to be utilized. Therefore, the purpose of this study was to validate a derivative of the HDS in the medical-surgical unit that could potentially provide a more efficient tool for predicting anticipated physiologic falls occurring in the medical-surgical setting. The purpose of this quantitative study was to determine the extent to which the overall score on the HDS, comprising medications, volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior variants, predicts the occurrence of patient falls in medical-surgical patients.

Research Questions and Hypotheses

There were three research questions used to evaluate the HDS's validity in the medical-surgical unit. The first question addressed all HDS variables, and the other two questions addressed variables grouped into categories based on (a) medications and volume of electrolytes and (b) communication and sensory needs, mental status, and behavior. Research constants were age, toileting needs, and last known fall.

Research Question 1: To what extent does the overall score on the Hester Davis Falls Risk Assessment Scale (HDS) predict the occurrence of patient falls in medical-surgical patients?

$H_0$1: The overall score on the HDS does not predict the occurrence of patient falls in the medical-surgical patient population.

$H_1$1: The overall score on the HDS does predict the occurrence of patient falls in the medical-surgical patient population.

Research Question 2: Using the Hester Davis Falls Risk Assessment Scale (HDS), do medications and volume/electrolyte status predict the occurrence of patient falls in medical-surgical patients?

$H_0$1: The HDS medications and volume/electrolyte status do not predict the occurrence of patient falls in medical-surgical patients.

$H_1$1: The HDS medications and volume/electrolyte status predict the occurrence of patient falls in medical-surgical patients.

Research Question 3: Using the Hester Davis Falls Risk Assessment Scale (HDS), do communication/sensory needs, mental status, and behavior predict the occurrence of patient falls in medical-surgical patients?

$H_0$1: Using the HDS, communication/sensory needs, mental status, and behavior do not predict the occurrence of patient falls in medical-surgical patients.

$H_1$1: Using the HDS, communication/sensory needs, mental status, and behavior predict the occurrence of patient falls in medical-surgical patients.

Theoretical Foundation for the Study

The theories and/or concepts that grounded this study included the health information technology (HIT) safety measurement framework (Singh & Sittig, 2016). The framework was anchored on developing valid, feasible strategies to measure safety concerns at the intersection of health information technology and patient safety. The framework aimed to address fundamental conceptual and methodological inefficiencies associated with defining and measuring health, information technology-related patient care safety measurement, monitoring, and improvement (Singh & Sittig, 2016).

The Logical Connections Between the Framework and Nature of the Study

The logical layout and concept of the HIT safety framework depict continuous quality improvement in healthcare. The HIT safety framework's significant idea is to present a quality data structure that can create a pathway for using technology to improve the quality of healthcare delivery (Sedig & Haggerty, 2017). The system made room for healthcare data type analysis, healthcare quality data elements and related code sets, elimination of ambiguity, and increased specificity. The model offered avenues to control mechanisms and prospects within medical quality data management systems aimed at assigning appropriate care standards using appropriate applications (Sedig & Haggerty, 2017). The standard was achieved by gathering performance measurement data and providing clinical decision support to optimize performance in targeted areas within the appropriate patient population.

Relationship Between the Theoretical Framework and the Study Approach

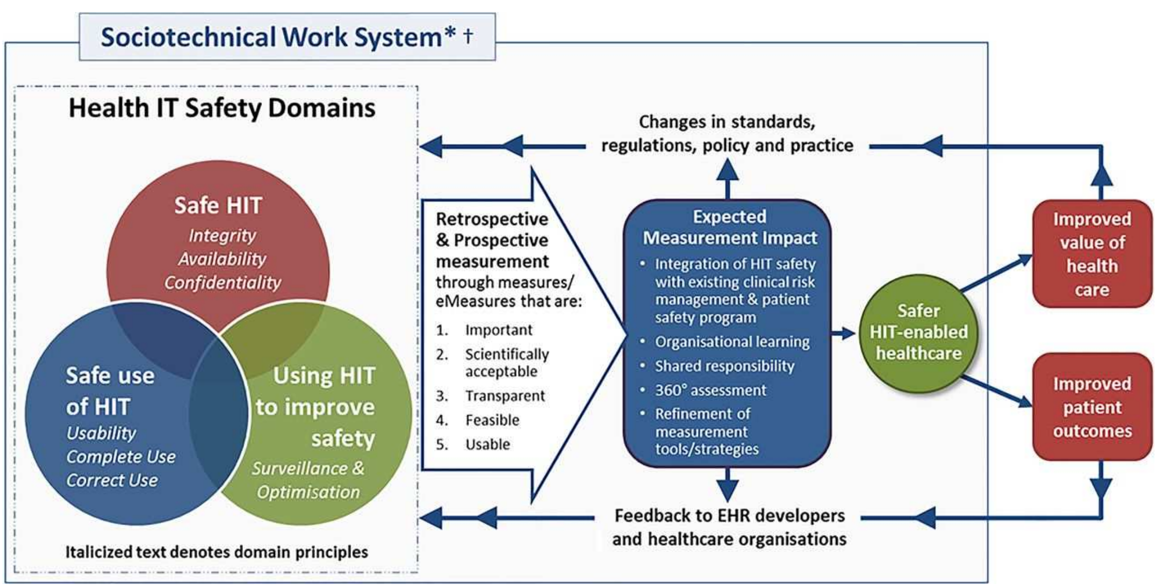
The framework was built on sociotechnical integration that calls for the need for measurement activities to address safety concerns in three related domains:

- Healthcare concerns that are unique and specific to technology, which address unsafe HIT related to unavailable or malfunctioning hardware or software (in this case, I examined the HDS)
- Challenges created by the failure to use HIT appropriately or by misuse of HIT. The study revealed the usability and efficiency of the falling scale.
- The use of the HIT framework to examine risks in the continuum of patient care, health care delivery processes, and outcomes to identify potential safety concerns before they can harm patients. I analyzed the HDS algorithms to evaluate the tool's efficacy.

The HIT framework proposes integrating retrospective and prospective measurements with the healthcare organization's existing clinical risk management and safety programs. The HIT model necessitates organizational learning based on an extensive 360-degree evaluation of HIT safety, placing the HIT framework as the appropriate framework to be applied in the study. The prototype encompasses healthcare applications, vendor involvement, refinement of measurement tools and strategies, and shared responsibility to identify problems and implement solutions with a long-term goal of enabling the principles of continuous quality improvement (Singh & Sittig, 2016). The framework is defined as the philosophy that encourages healthcare staff to ask the following questions continuously: How are we doing? Moreover, can we do it better? Furthermore, how can we do it better, presenting a continuous measurement that aids in achieving the safety benefits of HIT in a modern clinical setting (Ungvarsky, 2019)? The patient falls analysis score is integrated and stored within a patient's medical information record IT database application and continuously evaluated and adjusted as needed to meet the patient's inpatient fall prevention needs.

Figure 1

Health Information Technology (HIT) Safety Measurement Framework



From “Measuring and Improving Patient Safety Through Health Information Technology: The Health IT Safety Framework,” by H. Singh and D. F. Sittig, 2016, *BMJ Quality & Safe*ty, *25*(4), p. 227 (https://doi.org/10.1136/bmjqs-2015-004486).

* Includes eight technological and nontechnological dimensions, consisting of external factors affecting measurement such as payment systems, legal factors, national quality measurement initiatives, accreditation, and other policy and regulatory requirements.

Use of Health Information Technology Framework in the Patient Fall Study

Concerning my study, the fall tool scale presented a quality data set framework that effectively falls under the HIT framework. The HDS is a classification system by which measure scores are used to improve patient safety standards. The HIT conceptual framework was appropriate to synthesize the HDS for its suitability and appropriateness to be applied in the inpatient medical-surgical patient population or establish if there was a need to recalibrate the tool to meet appropriate standards in the given patient population. The application would improve patient quality measures based upon a proven measure-related logic.

Western medicine is credited with relieving symptoms and saving lives, such as in an emergency room setting. The approach involves a myriad of pills, injections, and other methods to stop pain and get patients back on their feet. However, often, these cures only address instantaneous issues. The approach involves viewing health as the absence of disease, as compared to healing, which is a treatment that addresses the body from the inside out over time. Recovery restores balance through lifestyle choices and natural means and can include safety, a healthy diet, exercise, meditation, and other techniques. In terms of healing, beneficial intervention encompasses patient psychological condition, physical condition, as well as their safety, emotional well-being, and mental health (Jacobs, 2018). Besides medicine administration, patient safety is crucial to ensuring that no harm is caused to the patient. According to HDN patient fall safety framework, the overall wellbeing of the patient is achieved by evaluating the patient on type of medications the patient is taking and volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior. The nine variables in HDN help in precisely predicting an anticipated patient fall or no fall, to help in formulating a care plan aimed at preventing patient falls.

Nature of Study

Quantitative correlational cross-sectional methodology was applied in the study. This approach was appropriate because results were numerical and could be tested and secondary data were used for statistical analysis. The cross-sectional method ensured that information was captured based on data gathered for a specific point in time, from a pool of participants with varied characteristics and demographics as part of the medical-surgical population. The study design used secondary data from Denver Health, a larger Midwestern hospital facility. The patient electronic medical information record (MIR) resided in Epic data base. The data were refined to only accommodate the medical-surgical patient population for the last 1 year. Data sets were limited only to the medical-surgical care department of the hospital. Patient scoring using the HDS as recorded and stored in the EPIC patient records database included medications and volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior covariates.

Literature Search Strategy

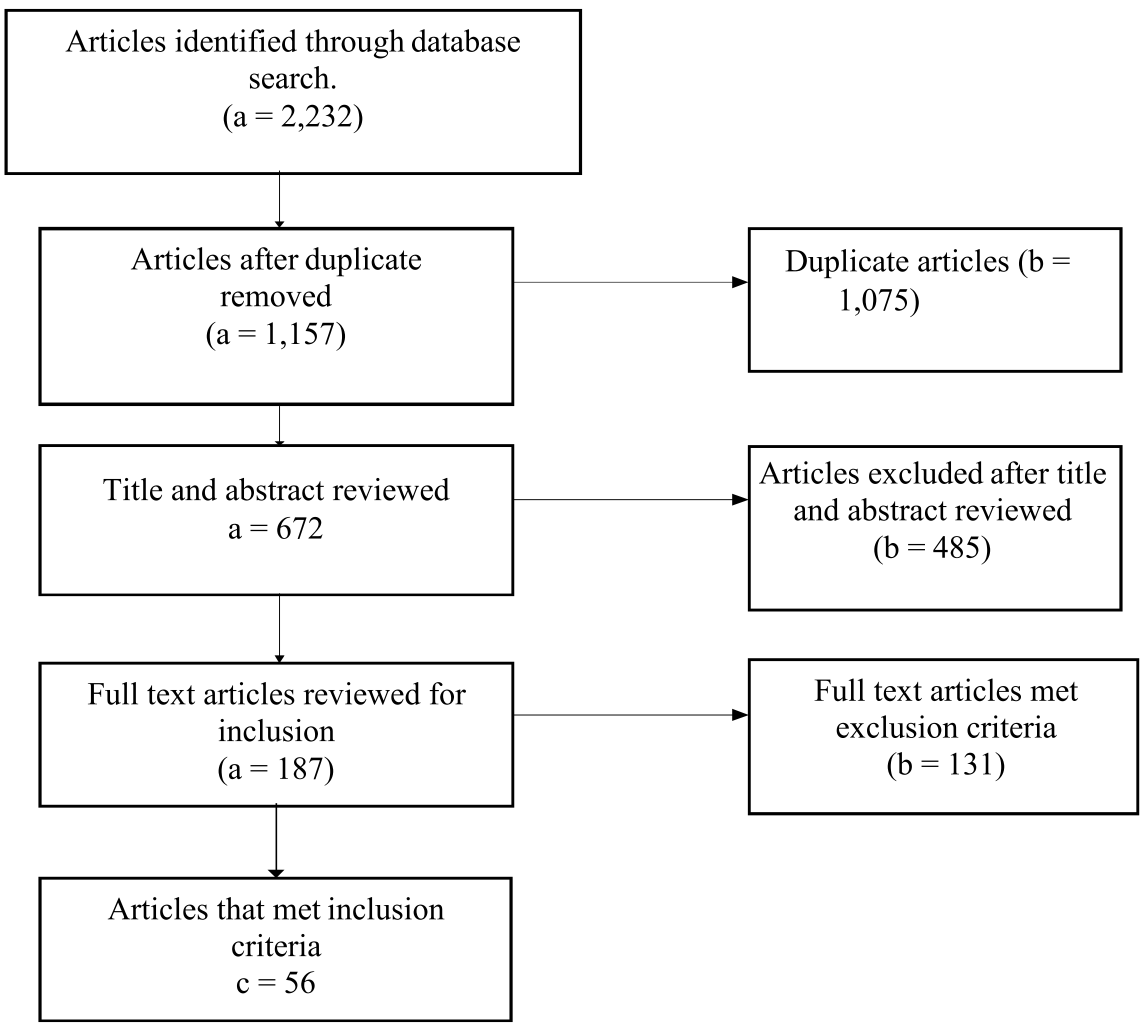
The literature search was conducted using the following databases: EBSCOhost, PubMed, Walden University databases, Scholar works, *American Journal of Nursing* Database (AJN), *Journal of Health Sciences* Database, Wiley Online Library, Elsevier, Google Scholar, Big Data Analytics, and BMC Health Services Research. The keywords and phrases that I searched included the following:

- fall risk assessment
- fall injury prevention
- patient falls
- predicting injurious falls
- national patient fall program
- factors associated to patient falls
- fall risk assessment tools
- fall risk predictive tools
- cost associated to patient falls
- impact of patient falls to society
- Hester Davis (HD) Nursing
- preventing patient falls
- hospital patient falls cost
- patient fall policies

Figure 2 is a flow chart that provides the process that I used to refine related and appropriate documents. I ensure that the articles reviewed were full text and peer evaluated. To ensure the reliability of the evidence, I conducted the research in alignment with the guidelines established in Walden University's *Manual for Systematic Reviews*. The discoveries analyzed were based on the evidence and not on my opinions.

Figure 2

Article Selection Flowchart



Note. *a* = the number of articles evaluated, *b* = the number of articles that did not meet the threshold and were eliminated, and *c* = the number of articles used for the research.

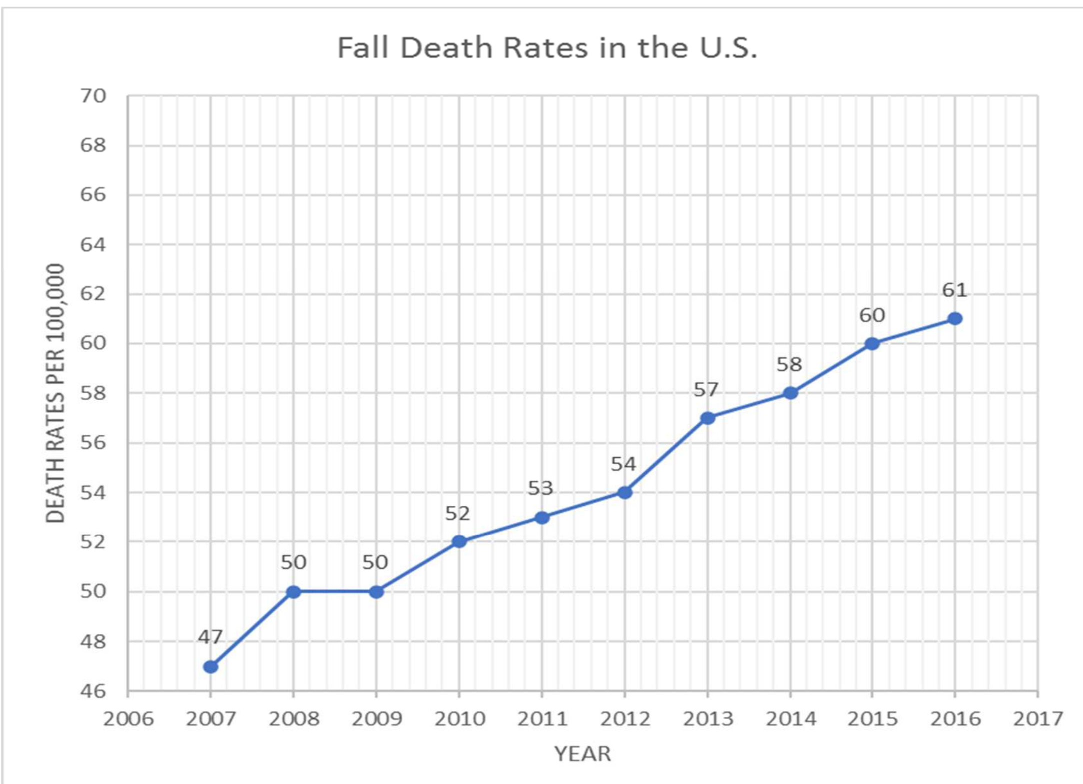
Challenge of Patient Falls in Hospitals: Literature Review

Patient falls are among the challenges facing the healthcare system. Indeed, every potential patient fall may result in fractures, injuries, or even death. Huang et al. (2017) observed that patient falls present an extra cost to healthcare institutions and patients, thereby prompting health care facilities to enact measures to reduce patient falls. According to Weil (2015), the fall rate for patients ranges between 1.3 and 8.9 for every 1000 days that a patient stays in a hospital. Lin et al. (2017) noted that patient falls account for the highest hospital-acquired conditions (HAC) whose reimbursement was withdrawn in 2008. The Centers for Medicare and Medicaid Services (CMS, 2018) halted the reimbursement program for HAC, especially for falls, to reduce patient injuries and increase patient safety.

One in every five falls that occur causes serious injuries that result in head injury or broken bones (CDC, 2018b). CDC statistics further indicate that 3 million older citizens in the USA attend emergency rooms for injuries related to falls. Campos and Askenas (2019) indicated that over 800,000 patients undergo hospitalization for injuries related to falls resulting in a hip fracture or head injuries. Singh et al. (2019) also noted that statistics for older people show that a minimum of 300,000 aged people undergo hospitalization for injuries related to hip fractures. Jacobs (2018) revealed that, with an increase in the number of hip fractures, patient falls have a direct role as the primary cause, accounting for more than 95% of hip fracture cases. The CDC (2018b) elaborated that patient falls are also detrimental in causing traumatic brain injuries (TBIs). In the wake of rising concerns, CMS (2018) observed the massive cost of fall-related healthcare cases to be a significant expense and of concern. A report by Janati et al. (2017) related to medical operations in 2015 revealed that more than $50 billion in bills came for reimbursement, and medical insurance schemes settled 75% of the costs. Figure 3 shows the increase in the number of deaths associated with falls in the United States.

Figure 3

Fall Death Rates in the United States



Note. From *Older Adult Fall Prevention*, by Centers for Disease Control and Prevention, 2018 (https://www.cdc.gov/homeandrecreationalsafety/falls/adultfalls.html). In the public domain.

The CDC (2018b) has projected that if measures are not taken, the United States will have seven fall deaths per hour by 2030. Wong et al. (2016) mentioned that patient falls result in the high cost of care because of associated injuries, hospital reputation, and reimbursement. These are some of the challenges facing healthcare leaders, healthcare organizations, patients, families, and communities. Dos Santos Oliveira et al. (2018) explained that one out of four individuals aged 65 years and older reported falling at a healthcare facility; other falls may not be reported (CDC, 2018b).

Florence et al. (2018) emphasized that patient falls continue to have a detrimental impact on hospitals, thereby prompting the establishment of critical measures to address this problem. The Joint Commission (n.d.) has promoted ideal prevention programs and policies that play an integral role in identifying high-risk fall patients and, according to them high-risk fall prevention measures. Additionally, essential practices for reducing falls are increasingly getting adopted by healthcare providers. Litigators have also adopted these programs and best practices as the dominant risk factors for high-risk patients. Education has assisted in understanding hospital fall cases from both a defense and a plaintiff perspective.

Contrary to the prevailing assumption that patients over the age of 85 are high risk for falling, changing dimensions now regard patients from the age of 70 who can fall as high risk (Sairafian et al., 2019). The quality and quantity of nursing care critically determine the risk of falling. Therefore, by improving nursing care, it may be possible to reduce patient falls in the healthcare system. The CDC evaluation on fall prevention has provided final reports on recreational and home safety for adult falls (CDC, 2018b). Age forms a fundamental basis for classifying patients according to their risk of falling. Healthcare facilities have reduced the baseline age to 70 years to enable them to offer quality assistance.

Environment of Care Factors Associated With Patient Falls

The incidence of falls among the elderly has rapidly increased, thereby prompting this to be labeled a medical concern. Lin et al. (2018) concurred with Sairafian et al.'s (2019) observations that apart from old age, other factors cause falls in hospitals. These factors include rising patient acuity, nurse shortages, and incompetent leadership at the hospital to instill a safety environment (Majkusova & Jarosova, 2017).

Inefficient Work Environment for Caregivers

Lack of effective ambulatory patient care tools presents another top reason for the increase in hospital falls. Caceres et al. (2019) observed that lack of necessary medical tools for comorbidity for patients and safe environments contribute to staff stress during patient transfer resulting in falls. Additionally, Barbe et al. (2018) cited nurses' delay in response as another reason for the increase in inpatient falls. Increased delay results in patient frustration, which may prompt patients to leave the bed without assistance. Lin et al. (2017) demonstrated the consideration of the quality of nurses because the content of care given determines the rate of falls. High-quality patient care offers quality services to patients while reducing the risk of patients falling.

Imbalanced Gait

According to Lin et al. (2017), lower body weakness increases the chances of falling. Patients experiencing difficulties in balancing and walking also are likely to fall while in healthcare institutions. Patients with vision problems require significant attention because they are susceptible to falling. Cary et al. (2018) observed that residential hazards such as uneven surfaces or broken steps in hospitals play a role as other potential causes of falls.

Support Staff and Coordination

Patient support staff failure to call for assistance from other nurses when help is needed in caring for patients is another leading cause of hospital falls. Hwang et al. (2017) equally expressed that confused and disoriented patients often fail to notify nurses of the need for assistance. In some cases, patients may be stubborn in accepting help; some may refuse any assistance even though it is needed. Nursing assistance contributes to falling reduction. In the study by Lin et al. (2017), evaluating factors and medical costs associated with fall events in hospitalized patients, the study observed that some patients attempt to walk by themselves when help is delayed and as such end up falling. Many hospitals have resorted to installing bed alarms to alert hospital administration when patients exit their beds. These alarms serve the purpose of ensuring that patients get assistance when they leave their beds.

Patient Alarms and Assistive Technology

Failure to set the bed exit alarm for high fall risk patients is another factor that contributes to the increase in falls. A survey conducted by the CDC (2018c) indicated that some patients who wander away from their beds risk falling or tripping. Therefore, bed alarms inform supervising personnel to take note of unwanted movements. They also inform personnel when patients move toward the bed (Majkusova & Jarosova, 2017).

Therefore, the bed-exit alarm's failure presents a detrimental scenario that exposes patients to unwanted risks of falls. Patient alarms form necessary essential equipment for the healthcare system to promote patient safety.

Sedative Medications

Patients on high-risk medications such as narcotics are also high-risk fallers. Sedatives and antidepressants critically increase the chances of falling because they make the patient confused and dizzy (Martin, 2017). Cangany (2018) urged that extra care should be observed when administering narcotics, as such drugs reduce the patient's mobility, thereby calling for maximum attention. A sedated class of patients needs the provision of high safety to prevent falls. Some of the proposed measures for patient assistance are low adjustable beds, scheduled toileting, and installation of bed alarms.

Identifying High-Risk Patient Fallers

Identifying an accurate and precise fall risk measurement tool is crucial in fall prevention. Edwards and Holthaus (2017) observed that aligning of the correct tool to the correct patient population is a challenge for health care facilities. Patients present diverse classes of diseases and needs. For example, a patient with a broken knee might not present same conditions as a cancer patient. Fall prevention tools may give false reading when applied to a patient population before being validated and justified, to ascertain the actual predictive index. Due to the misalignment of the tool and the correct patient, patients with a high risk of falling may be labeled as low-risk fallers. When incorrectly scored, patients attempt to move independently; they are likely to experience critical falls resulting in massive injuries. The wrong diagnosis affects the location of the patient bed relative to the nurse station. It also affects the choice of nonslip footwear and subsequent observation during a hospital stay.

The challenge of patient falls in healthcare continues to escalate. In his observation, Weil (2015) affirmed that patient falls in hospitals continue to rise and emerge as a growing concern. Weil further observed that increased accident reporting for older patients will positively impact healthcare systems. Additionally, Weil called for the consideration of increased reporting on more impaired, heavily sedated, and acutely ill patients. Mata et al. (2017) concluded that nursing personnel ought to spend more time at the bedside to ensure that all issues affecting high-risk patients get sorted on time.

Research on the Impact of Patient Falls

Patient falls in the hospital adversely affect both the younger and older generations. However, members of the older generation have dire impacts when they fall. Observation of multiple studies indicated that many hospital patient falls result in adverse injuries. Campos and Askenas (2019) noted that one in every five falls results in serious injury. Patient fall injuries may alter or inhibit patient ambulation or result in their deaths (Janati et al., 2017). A patient's fall may result in the breaking of bones such as the arm, ankle, wrist, or hip (Montgomery, 2018). The patient falling may also experience a fatal head injury. Older people falling on their heads should immediately consult their doctors to reduce the chance of brain injuries. Another impact of falling is the resultant development of fear (Janati et al., 2017). Though they might not hurt themselves during the fall, patients may develop fear and tend to avoid daily activities. Diminished or restricted activities perpetuate the weakening of body muscles. The progressive muscular degeneration, in turn, increases the chances of patients falling. Therefore, falling impacts patients' wellbeing, whether they are hurt or not.

Risk Factors Attributed to Patient Falls

The increase in patient fall cases has prompted increased research activities in the field of risk factors. For instance, Fernandez (2019) asserted that patients above the age of 70 are at a higher risk of receiving narcotics or antihypertensive drugs. The presence of higher risk fall factors results in a higher risk of falling and vice versa. Therefore, the hospital can minimize the personal risk of falling by reducing the principal risk factors associated with the individual. Primarily, healthcare providers must engage their patients to aid in understanding their health goals. Understanding patient risk information contributes to modifying fall risk factors, thereby helping patients meet their goals. Some of the leading risk factors that influence the scope of patient falls are addressed in the sections that follow.

Vision Impairment

Although old age is a risk factor for hospital falls, poor vision in older age further increases the risk. Sight impairment has been observed to increase with age. The impairment of vision features as one of the essential risk factors for falls in hospitals. It affects the older generation more widely than younger patients (Weil, 2015). The evidence relating to the increase in perceptions and views on falls suggests that poor vision ranks high as a cause of hospital falls.

According to information derived from the CDC (2018d), more than 12 million Americans above the age of 40 experience impairment in their vision. This number is significantly rising as the population ages, and it is expected to double by the year 2050. Further, one in every four Americans above the age of 65 experiences a fall that results in injuries. The presence of impaired vision doubles this risk, thereby putting members of the older generation with this condition at risk of falling. Falls in hospitals are detrimental because they result in serious injuries. In turn, these injuries decrease mobility and translate into a loss of independence. As a mitigating factor, elderly individuals in America are encouraged to undergo yearly vision check-ups to ascertain the status of their sight. Periodic eye checks help eliminate loss of vision and further reduce the risk of falling among patients above the age of 65.

Foot and Ankle Pain

Common symptoms that illustrate the presence of a foot problem include pain, redness, swelling, numbness, and tingling. These symptoms are synonymous with adults in old age, when it takes significant grit to walk with numb feet, blisters, or red feet. All the symptoms highlighted above indicate foot problems, and they affect the scope of walking and posture. They detrimentally increase the risk of falling and injuries to the elderly. Typically, the feet experience critical wear and tear associated with many years of walking, jumping, running, and standing (Ajerla et al., 2019). All these activities impose pressure on joints, muscles, bones, tendons, and ligaments. Foot pain arises from increased strain under the heels and the balls of the feet. The risk factor is confirmed by a report by Muchna, et al (2018) stating that one in every three Americans above the age of 65 experiences aching feet, stiffness, and pain. The study further elaborated that pain manifests in various classes, which include bunions, fractures, calluses and corns, hammertoes, ingrown toenails, and stiffness of the joints. All these indications become profound in older age, thereby increasing the risk of falling at home or in the hospital.

The Fear of Falling

Fear of falling contributes to a significant number of falls in the United States. It is associated with adverse psychosocial and physical health outcomes that include activity restriction and depression. According to Lenouvel et al. (n.d.), falling causes fear, anxiety, and loss of self-confidence, resulting in mobility avoidance. Fear denotes the patient's anxiety syndrome developed through previous falls that hinders them from engaging in walking activities. Despite fear of falling being described as a symptom, sometimes medical practitioners regard it as a diagnosis that encourages falls (Agbor et al., 2016)

Medication

Medication has also been noted as a risk factor that increases the scope of falls. Records reveal that more than 70% of adults above the age of 65 take medications at home (Edwards & Holthaus, 2017). The number of people on medication increases among people in foster and nursing homes. Medication features as another cause of falls among elderly patients.

Medicine Consumption

A wide range of medicines have been identified as among the risk factors for falls in hospitals. These drugs are prevalent among older adults, thereby increasing their risk of falling. The need to reduce the risk of falling calls for the reduction of these medications. These medications fall into three main categories.

The first category consists of medications that affect the functionality of the brain (Weil, 2015). These medications are regarded as psychoactive, and they often result in drowsiness or sedation. People with memory problems experience increased confusion after consuming such drugs.

Another category of drugs that increase the risk of falling consists of medications that affect blood pressure. A sudden drop in blood pressure increases the risk of falling. Clinical records show that adults experience low blood pressure when they stand for a considerable duration. Such medications include tamsulosin.

The last category of drugs that increase the risk of falling is drugs that lower blood sugar. This category mostly affects older adults with the existing condition of diabetes (Weil, 2015). People with diabetes have a higher risk of falling, and the consumption of hypoglycemia drugs consistently increases that risk. Medical practitioners have expressed concerns relating to the continued prescription of these drugs because they increase patient falls. Indeed, the reduction of these drugs results in reduced risk of falling in health facilities.

Vestibular Disorder

The first risk factor that influences the rate of patient falls is poor balance. Poor balance also goes by the name of *vestibular disorder*. The vestibular system is in the brain's inner parts and the ear, with a primary role of establishing balance and eye movement. Often, the presence of diseases, injuries, and aging results in ailments and disorders associated with the vestibular system. One of the common symptoms of vestibular disorder is dizziness. These disorders result from head injuries, viral infections, and widespread aging (Lin et al., 2017). Human genetic and environmental factors also contribute to the occurrence of this disorder. A person's balance disorder can be treated or be improved by treating other underlying diseases. Vestibular rehabilitation therapy, medications, surgery, and home-based exercise are some of the applications that can improve vestibular disorder.

Vitamin D Deficiency

The second risk factor for consideration is vitamin D deficiency. Vitamin D deficiency manifests as a disease affecting the bones; it manifests as osteocalcin in adults and rickets in children. Clinical evidence indicates a relationship between muscle function and vitamin D (Weil, 2015). A severe case of vitamin D insufficiency is regarded as myopathy, which has adverse impacts on adults. Indeed, the presence of vitamin D deficiency adversely affects the wellbeing of the elderly population in hospitals (Jacobs, 2018). This deficiency increases their chances of falling, thereby impairing their health. Members of the elderly generation who are affected by this condition experience severe muscle weakness that involves proximal and lower limbs.

Indeed, there are extreme cases of vitamin D deficiency that are underdiagnosed. Underdiagnosis occurs due to progressive and nonspecific symptoms associated with the ailment. Some of the observable signs include muscle pain, arthralgia, and inflammatory rheumatic disease. In study of muscular deficiencies and vitamin D by Fernandez (2019), the findings indicated that 30% of muscular biopsies that were association with historical deficiency of vitamin D, revealed the presence of widened inflammatory reactions and muscle fibers atrophy.

Low Muscle Strength

The relevance of muscle strength plays out as a risk factor when dealing with falls targeting older generations. Muscle strength contributes toward the establishment of postural stability. The aging process results in decreased muscle strength, thereby increasing the chances of falling. Rochon and Salazar (2019) agreed that members of the aging population may lack a stable grip on their walking aids, and this enhances their tendency to fall. Different activities result in sarcopenia, but the leading causes include low activity and poor nutrition amongst the elderly. Lower hormonal levels and the presence of chronic diseases also lower muscle strength, thereby increasing the rate of falls among the elderly population.

Home Hazards

Home injury facts have been identified to be the cause of nearly one-third of the non-fatal injuries (Granbom et al., 2019). Falls occurring due to hazards resulted in skinned knees, broken bones, or death. Falls occur due to hazardous reasons that can also signal the beginning of lifestyle change for the older generation. According to Granbom et al. (2019), the presence of hazards in homes and hospitals critically enhances the risk of falling amongst the frail older people. Ideally, hazardous, and unsafe environments pose more risks to the older generation, which calls for the need to keep healthcare facilities and homes safe. Some of the measures of enhancing safety and removing risks in these facilities include clearing of floors by removing clutter, pet gear, throw rugs, and all other items that facilitate tripping. The facility should accord plenty of walking space by removing or arranging furniture (Ajerla & Zulkernine, 2019). Another measure of ensuring safety in occupational places entails putting the essential items they can easily access.

Another recommendation for enhancing safety for older people in hospitals is to add rails and grab bars in bathtubs, next to the shower and next to the toilets. The areas around the door should have sufficient light to illuminate all objects and the walkway. Every puddle and ice should be removed from the path to ensure that older people walk in a clear path (Majkusová & Jarošová, 2017). Indeed, hazards increase the risk of falling for the aged generation because they experience restricted movements. Indeed, as people age, falls and risks should be avoided to ensure that older people and all around them are safe.

Challenges of Patient Falls

Patients who have once fallen stand greater risk of falling again. Falls have dire consequences that range from head injuries to broken hips. According to CDC (2020) statistics report on patient falls, one out of five falls causes a fatal injury such as broken bones or a head injury, the report further indicates that each year, 3 million older people are treated in emergency departments for fall injuries. The CDC finding shows that in 2015, the total medical costs for falls amounted to more than $50 billion, of which Medicare and Medicaid shouldered 75% of these costs (CDC, 2020). Approximately 800,000 patients undergo hospitalization because of injuries associated with falls (CDC, 2020). The state government spends significant amount of money in treating these patients. Financial records dating back to 2015 shows that the government spent $50 billion on fall costs (CDC, 2020).

Majority of the patients who fall express fear associated with falling again. The resulting fear often cause the concerned patients to reduce their daily activities. It follows that reduced activities results in physical weakness. Thus, the first falls instill fear and creates opportunity for further falls. Other impacts of falls include financial instability occurring because of high medical bills. The injured people also suffer the cost of lost wages.

Patient Falls and Injury Prevention Literature Chasm

Falls result in detrimental outcomes for all ages and especially, older generation above 65 years. Therefore, healthcare facilities must enact measures of preventing falls and deterring injuries associated with falls. The complexities associated with causes of patient falls has prompted critical research from different scholars. Research conducted by Heng et al. (2020) provided an analysis of the articles highlighting fall prevention through educational programs. In their view, the application of the four strategies would significantly reduce falls. These strategies include direct face-to-face education of patients, educational tools, and patient-focused fall prevention information coupled with hospital systems, procedures, and policies.

Direct Face-to-Face Communication With Patients

Conduction of patient education bridges the gap and existing mismatch between the actual versus the perceived risks of falls. Qualitative study results have illustrated the need for patient education in alleviating risk associated with falls. Patients with adequate education on factors influencing falls and the severity of the falls make informed decisions. The presence of this information helps the patients to avoid risky ventures like getting out of bed without assistance, calling for assistance when the need arises, and significantly avoiding risky ventures (Morse, 2009). Face-to-face interaction with the patients helps caregivers to understand the patients and their behaviors. This method is preferred because it provides immediate feedback from the patients. This aspect of fall reduction considers the basis of behavioral change.

Patient and Staff Education

In the randomized research by Jacobs (2018), a patient falls educational program is provided immense benefit to the patients, thereby reducing falls. Patient education potentially reduces the scope of injuries associated with hospital falls. However, the structuring of patient education should focus on the specific needs of the patient. The structure should also focus on education delivery, including targeted effectiveness. The unique features of the targeted population inform the considerations that need to be made. A relevant example of education relates to the establishment of different educational lessons tailored for different individuals. As such, patients with impaired cognitive receive education tailored to handle different languages and backgrounds (Patrick et al., n.d.). The people with a known and recognized history of falling are likely to respond to specific techniques of fall prevention.

The study by Horová et al. (2017) noted that the most critical strategy for reducing patient falls advocates for incorporating intervention programs. The study recommended that offering education to staff and patients is the best strategy for reducing falls in hospitals. Additionally, Horová et al. (2017) observe that the educational program's success depends on the compliance system, healthcare leadership, incorporated technological support, and essential clinical training of teams involved with the patients. Indeed, it falls amongst the elderly in the hospitals continue to be a growing concern. However, a joint effort involving all the stakeholders in the health care profession contributes to the establishment of safety.

Generally, in multiple studies, staff education related to assessment and suggested intervention measures have been highlighted as the best practice for protecting the elderly. Thus, a medical directors association of critical guidelines has agreed on the need to ensure that all the nurses and other staff working in these establishments undergo necessary education regarding risk reduction in hospitals. Lewis' change theory considers the hospital staff's empowerment with information relating to risks (Patrick et al., n.d.). The staff is accorded information that assists them in recognizing risk factors. The staff also conducts fall risk assessments while using the Morse Fall Scale (Morse, 2009). These nurses are also assisted in the development of an individualized care plan for managing fall risk. The development of personally tailored management fall risk plans has proven essential for reducing healthcare facilities' risks.

The research project aligned with Walden University's optimistic social change goal of leveraging research and networks through use of research to improve patient's quality of life by reducing falls and injuries. The findings of this study could lead to positive social change by validating the HDS's ideal settings, to effective application in medical-surgical patient population as a strategy in reducing patient fall incidences. The intricacy of healthcare especially in medical-surgical patient population requires the health care professionals develop and apply alternative workable technology for providing safe, quality care with deliberate efforts to be effective and cost-efficient (Day et al., 2014). Health care leaders should understand best practices that can improve and improve patient care outcomes in the continuum of care (White & Dudley-Brown, 2012). Patient falls technologies have evolved. HD Nursing offers an opportunity to reduce patient falls, decrease costs and can serve as a useful instrument for health care leaders to evaluate and monitor patients at risk for falls. Nurses with adequate knowledge of fall risk factors make decisions that keep their patients safe. This knowledge coupled evidence-based recommendation on practice contributes to developing positive social change occurring through improved staff competency. The overall benefit is the decrease in adverse patient outcomes occurring through patient falls.

Rationale for Best Practice in Fall Prevention

There are emerging concerns challenging how best practice for falls prevention exists in the healthcare facilities. According to Day et al. (2014), the community-dwelling for older adults has not provided clear guidelines for implementing the best practice of activities related to nursing training and empowerment. An investigation relating to the hospital falls conducted by Hospital Admission Risk Programs (HARP) reveals the need to provide coordinated and specialized care for high-risk people during hospitalization (Patrick et al., n.d.). The research questionnaire considered medication review and exercise prescription because these are evidence-based falls with an ideal fit with HARP services.

With the aspect of falls taking center stage in the global market, different hospitals have incorporated various strategies that target clinicians' education, modifications of the environment, and the use of assistive equipment, existing medical reviews, and hospital review. Patients have limited options for reducing their chances of falling while at the hospital (Morse, 2009). However, the education system's ideal information targeted the incorporation of programs that touch on diagnosis and hospital settings. Understanding these reviews suggests an improvement in the nurse's training (Andersen et al., 2020). New evidence in falls prevention asserts that patient education that considered all staff and stakeholder concerns results in the decline in associated risks and other injuries. The injuries include fractures, bruises, and lacerations. The healthcare facilities determine the outcome of the exercise results in an improved self-perception risk, general knowledge advancement, empowerment of patients to help them in significant risk reduction.

Sociodemographic Patterns of Outpatient Falls

Understanding the frequency of falls contributes towards the determination and elimination of risk factors attached to different groups. Indeed, health and retirement study emphasize randomized logic concerning the prediction of ethnic/race likelihood of falling frequency. Sairafian et al. (2019) studied on over 10,000 Medicare outpatients survey has proven beneficial in highlighting the existing differences between the impacts of falls on various groups of the population. The study shows that African Americans are less likely to experience recurrent falls than whites of Hispanic origin among adults over 65 years old. This information helps healthcare providers provide care for older patients (Sairafian et al., 2019). Mata et al. (2017) emphasized that the whites of Hispanic origin must be accorded utmost care as they are more likely to have repeated instances of falls during their stay in the hospitals.

Fall Risk Assessment and Prevention Tools

The components of preventing falls are critical, and each should be performed categorically. There is an existing relationship between all the components of fall prevention tools because they share a common factor. The first instance of integrating these tools involves the development of a clinical pathway. A clinical pathway entails a structured interrelated care plan designed to offer support while implementing clinical guidelines. The pathway has been in utilization for generations, where it provides steps for managing patients. Fall prevention strategies also aim to reduce the tendency of overlooking the affairs of patients by busy caregivers. Therefore, it facilitates the delivery of evidence-based preventive care. An example of clinical pathway utilization is the facilitation of tools and resources (Singh et al., 2020). The tools applicably assist hospital staff in designing new systems that involve frontline staff training. It also noted the onset of a clinical reference tool that meets individual needs.

Despite the benefits associated with the integration of fall prevention tools, some challenges are hindering the success. Generally, multiple hospital provisions highlight the failures of the comprehensive risk assessment tools by stating some the risk factors omitted or included unnecessarily in the fall tools depending on the aimed patient population. The omitted risk factors include medications and mobility, amongst others. Secondly, the fall risk score depends on association with the standard step of intervention measures (Duckwort et al., 2019). These measures are not customized to suit the needs of individual patients. Therefore, the blanket application of these principles mostly fails the fall prevention tool. Most of the current fall risk parameters consider all patients' categorization scored as a high risk for falls and are accorded prevention strategies. Some hospital medications include those classified as high risk for falls whereas other hospitals classify same medications as normal, lacking uniformity (Duckwort et al., 2019). Some hospitals have experienced rising failures owing to their overreliance in bed alarms as one of the fall prevention strategies. Using various flags for indicating fall risks has become ineffective because the staff has misused this aspect as well (Duckwort et al., 2019).

Morse Fall Scale involves using the rapid and straightforward method of assessing a patient's probability of falling. Most medical practitioners and nurses have primarily adopted this fall prevention tool. It can provide accurate outcomes during the fall risk assessment, and it takes limited time to complete. Contrary to the Berg balance scale and mobility capacity interaction, 83% of the nurses demonstrated comfort when using the Morse fall scale (Dos Santos et al., 2018). Sometimes the failures in fall risk prevention involve the contributions of the nursing staff. The presence of the scores presents the case of every patient as high risk, and this primarily impairs the hospital personnel from tackling fundamental complexities affecting the patient. These complexities are the reason for hospitalization for the patients. Therefore, overreliance on these scores results in the impairment of quality treatment.

Hester Davis Falls Risk Assessment Scale

The aspect of fall risk assessment tool, essentially, is to provide vital guidelines as a component towards patient fall prevention program in the continuum of care. Despite the presence of various risk prediction instruments, the choice of ideal instrument depends on the reliability of the item. The HDS has been widely used in the United States to assess fall risks in south central part of the United States. 1,904 patients in the neuroscience unit validated the prospective of HDS (Grillo et al., 2019). HDS denotes the falls risk assessment tool that was developed to help in predicting falls occurring in adults in different settings. The provisions of HDS plan ensure adjustment to cater for the patients existing condition. This tool came into existence following invention of Doctor Hester and Davis. These two doctors conducted critical research in the neuro department that resulted in the establishment of this remarkable scale. The leading success associated with HDS assessment tool follows its development based on the specific needs of the market. the doctors conducted critical research to fulfil the existing need in the hospital. Yes, Schmid fall assessment tool provided closer to the expectation, but it lacked critical evaluation. Therefore, HDS FRAT came into existence as an improvement of Schmid.

The development of HDS followed extensive research conducted by the two doctors over a two-year period. The research involved retrospective analysis of the patients who have experienced falls. The proponents of HDS gathered data from the patient records and variance records and used the data to construct a scale (Rochon & Salazar, 2019). The doctors further tested the scale in one of the nursing units. Further, the nurses using this scale as a pilot product made recommendations for further improvements. The doctors implemented the nurses' recommendation and subjected the machine to further testing and improvement. Eventually, the doctors deployed the machine for utilization in the nursing department and the entire medical facility. Both tests proved successful with positive results, and this encouraged the enactment of HDS (Grillo et al., 2019). Indeed, HDS continues to provide positive results to the patients and facilities. Hence. The increase in its adoption. Certainly, HDS has undergone complete psychometric validation to emerge as recognized guideline for assessing valid fall risks.

Variables for Hester Davis Falls Risk Assessment Scale

One of the leading reasons for the wide adoption of HD scale in risk assessment pertain to its scope of selecting and supporting interventions tailored for accurate risk factors. Also, the method considers the use of wide range of variables. These variables necessitate realization of accuracy for the factors under investigation. The variables also provide vital response to the research question depicted by the hypothesis. These variables include fall history, mobility, medication, cognitive impairment, toileting needs, sensory and communication issues. An illustration of the variables is shown in Table 1.

Table 1

HD Nursing Fall Variables and Score

	Cases present (*n*)	Missing data (*n*)	Sensitivity (%)
Age	152	0	
0–19 years	3	N/A	2
20–40 years	16	N/A	10.5
41–60 years	35	N/A	23
> 60 years	98	N/A	64.5
Fall history	51	0	33.6
Mobility	102	0	67.1
Medications	97	2	64.7
Cognitive impairment	50	0	32.9
Toileting needs	33	1	21.9
Volume/electrolyte issues	37	0	24.3
Communication/sensory issues	55	0	36.2
Behavioral issues	75	3	50.3

Note. N/A = not applicable.

Benefits of Using the Hester Davis Falls Risk Assessment Scale

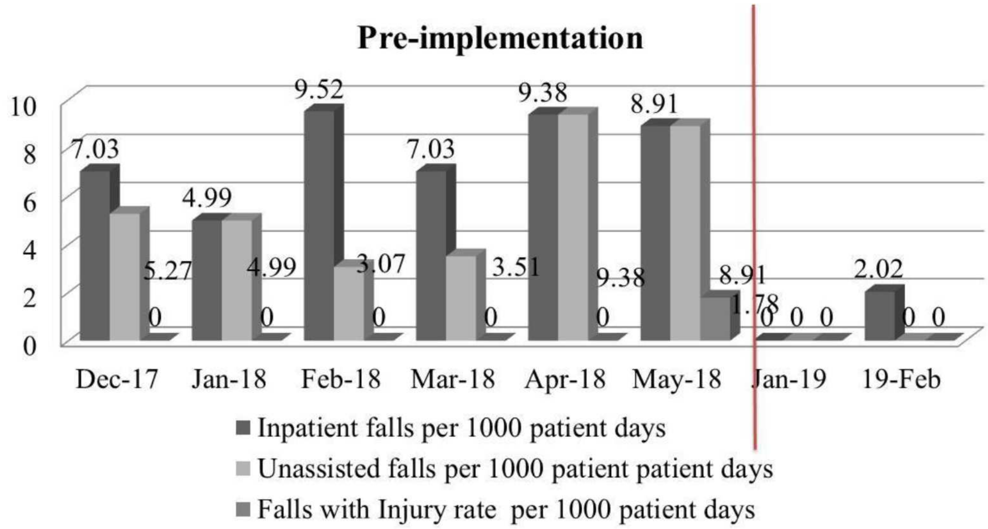
The first benefit attributed to the use of the HDS considers the fact that the nurses developed it. Nurses have clear picture of the factors they face on duty and the development of this fall risk assessment tool comes handy because it considers recommendations by the nurses to enhance its development and application. Nurses also attribute the aspect of the FRAT assisting them to meet their mission. HD scale utilization provides more sensitive and applicable help to the nurses thereby helping the nurses to offer top-notch assistance to the patients. Yes, sensitivity and personalized assistance gives this FRAT an advantage over other methods.

HD falls has undergone licensing that gives authorization for its utilization. Medical facilities that use HD scale must pay the initial and annual subscription fee to continue using the method. Payment of the fee creates a personalized plan of use (Rochon & Salazar, 2019). It also gives access to competencies, patient education forms, instructional video, care plan and the entire falls program. Additionally, HD scale assessment tools can be customized into different languages. Contrary to other fall assessment tools, HDS effectively works in variety of environments that includes outpatient and in-patient facilities. This also forms the only Fall risk assessment tool adopted by the hospitals because of benefits it accords to the patients.

Finally, the adoption and use of HD scale in hospitals significantly reduce the scope of injuries associated with hospital falls. Sample data from the neuroscience unit of the hospital reveals the state and severity of falls before and after the implementation of the HDS. Figures 4 and 5 depict the pre and post HD Nursing fall intervention program outcome in one Midwestern hospital (Philip, 2019).

Figure 4

Pre and Post HD Nursing Implementation Outcomes



In Figure 4, first column shows number of patient falls per 1000 patient days; second column showing unassisted falls per 1000 patient days and third column indicating falls with injury rate per 1000 patient days (Philip, 2019).

Figure 5

Pre and Post Implementation of HD Nursing

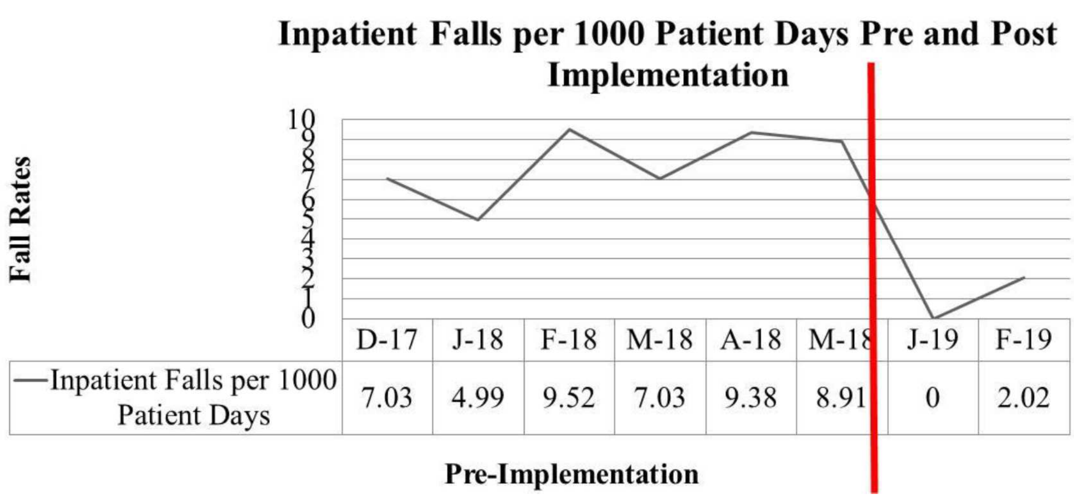


Figure 5 shows pre and post implementation of HD Nursing trending (Philip, 2019). The first graphs depict pre-Hester Davis fall data, and it reveals an interesting column of falls with injuries. The highest falls with injury column being May with 1.94. Interestingly, post Hester Davis fall data implementation records no column for falls with injuries. Despite recording reduced number of falls with no injuries. Therefore, the application of the HDS effectively reduces falls occurring in patients.

Policies on Patient Falls Prevention

Falls have become one of the leading threats to the independence and health of older adults. The CDC fraternity believes that falls are preventable. Serious commitments must be established to ensure that people have longer lives free from recurrent falls. Prevention of falls is possible by enacting prevention programs and policies (CDC, 2018c). These programs target communities and health care organizations where they encourage healthy practices that reduce falls. These programs have immensely reduced the scope of falls.

Centers for Disease Control and Prevention Policy Intervention

The CDC has been instrumental in enacting policies targeted towards the realization of reduced falls amongst older people. Stopping Elderly Accidents Deaths and Injuries Initiative (STEADI) policy involves using standard and practical guidelines that assist primary healthcare workers in addressing older patients with the utmost care (CDC, 2018b). This policy seeks to provide more information to the caregivers, thereby understanding fall risk, offering patients working solutions, and identifying modifiable risk factors. The basis of the CDC policy considers screening of older people to identify their fall risk status. The policy also considers the knowledge of assessing their modifiable fall risk factors (CDC, 2018a). The policy then identifies appropriate intervention steps to help in reducing the risk. All these attributes are achieved through enacted community strategies and effective clinical combinations.

Stopping Elderly Accidents, Deaths, and Injuries (STEADI) policy has proven to be essential for healthcare workers because of the capacity to reduce falls (CDC, 2018d). Indeed, it helps the caregiver foster good relations with their clients, who are older people. The policy provides free resources to the targeted clientele. These resources include case studies and highlights for engaging older people about falls. The second resource entails listing instructional videos for measuring functional ability (CDC, 2018b). The policy also entails screening tools and educational materials to help both patients and their family members.

The CDC policy on falling highlights the role people above the age of 65 years plays in reducing the risk of falling amongst them (CDC, 2018d). The policy encourages older people to have open engagement with their caregivers regarding their fear of falling. Older adults within this age group are encouraged to exercise more. Exercising has the benefit of ensuring a balanced body and improved strength. The policy also takes into consideration the impact of two risk factors that enhances a fall. It, therefore, encourages the older adults to have their feet and eyes checked on periodic intervals. Also crucial to the policy to consider is making their homes safer (Dos Santos et al., 2018). The policy encourages the removal of things that may cause them to trip. Additionally, the guideline calls for the removal of rugs because they cause slipping. The enactment of the above factors has enabled the center for disease control and prevention to be at the forefront in protecting older people against cases of falls and adverse impacts associated with falls.

Medicare No-Pay Policy on Hospital-Acquired Patient Falls and Diseases

As one of the integral participants in the healthcare system, the contribution of Medicare significantly influences fall prevention activities. Medicare Policy safeguarding fall protection was instituted in 2008. Centers for Medicare and Medicaid Services (CMS) halted the reimbursement of costs related to falls to the hospitals. The establishment of this policy ensured that hospitals and caregivers take responsibility for older people (Florence et al., 2017). This policy directly impacted the prevalence of four vital fall prevention practices: sitters, physical restraints, sitters, and bed alarms. The CMS policy enactment prompted the nurses to perform more fall-related adjustments using bed alarms being recorded as the most utilized prevention strategy. Therefore, it is notable that the no-pay policy initiated by CMS positively impacted nurses on fall protection practices.

The Medicare policy in fall prevention stemmed from the need to cushion the increasing expenditure on health insurance. With the budget rising above 30 billion dollars, Congress was tasked with finding a rising expense (Florence et al., 2017). CMS liaised with the CDC to identify the leading causes of increases in medical bills, and the aspect of falls came up. The compensation by Medicare emerged as one of the preventable hospital-acquired conditions. Further analysis revealed that falls could be prevented through the adoption of best practices of the evidence-based-intervention method. The case presented to the Congress relating to the preventability of the cases was weak. These same cases presented technical difficulties during claims establishment (Dos Santos et al., 2018). Therefore, CMS decided to enact the no-refund policy to ensure that healthcare facilities are put to task to prevent falls. Indeed, the enactment of the policy promoted various hospitals to increase the use of fall prevention strategies. Following the enactment of the policy, numerous nursing fall prevention attributes have been tested. Further research has been conducted to ascertain the effectiveness of the communication intervention, such as introducing the wrist band, utilization of bed alarms, sitters, and the reinforcement of physical restraints, among others.

Reports have illustrated those registered nurses offer reliable and accurate services, meaning that their clients experience low fall risk (Schmidt, & Brown, 2015; Wilson et al., 2015). Therefore, the prevailing high risk of falls is ideally dependent quality of service accorded to the patients. It follows patients who are strictly observed experience fewer falls during their stay in the hospital. Similarly, the reverse is true where poor service is accorded to the clients (Florence et al., 2017). The implementation of this policy targeted a reduction in the massive costs of healthcare. The guideline was enacted to ensure the government received savings due to increased falls acquired during hospital visits. Indeed, the policy received success by forcing hospitals and other caregivers to be more observant. It reduced the nurses' cases of negligence by forcing them to increase the utilization of bed alarms that reduces falls in the hospital. The fall prevention policy has improved the quality of care accorded to older people because their protection against falling has been at the forefront of safety issues.

Joint Commission Policy on Fall Prevention

While undertaking its duties, the joint commission has taken a critical stance to enact policies that target the patients' wellbeing. The JC policy requires that all hospitals develop and implement process targeting reduction of patient harm in case of falls for both inpatient and outpatient facilities (The Joint Commission, 2014). Fall risk is a concern in hospitals, affecting both the elderly and patients across any age group. JC policy depicted as goal 6 of the international patient safety goals has been divided into two to capture inpatient and outpatient (The Joint Commission, 2014). These policies clarify that fall risk tools need to be available for the patients. Every patient from across the age group should have fall risk tools tailored for them like the pediatrics and the elderly. The obstetric should have their unique fall risk factors.

The policy holds that patient scores in the fall risk assessment be documented as one of the medical records. This information is beneficial in facilitating quality care to the patient. Patients for hospitalization should be periodically checked because of the hospital's changing circumstances that may alter the results. The guideline gives every organization authority to derive their fact sheet from evaluating the patient's fall risk score. However, guideline development must conform to the universal requirements (The Joint Commission, 2014). The organization may involve factors that result in an in-depth assessment to obtain a specific outcome. Implementing the Joint Commission policy has provided a guideline and basis for the hospitals to operate while considering fall risks. Proper implementation of the policy for both outpatient and inpatient populations has reduced the risks associated with falls. The policy is termed as Standard IPSG.6 and standard IPSG.6.1.

The Economic Burden Related to Patient Falls

Falls occurring to older people have become common, and it has emerged as one of the public health problems in the American economy. The falls have become detrimental to the government and personal accounts because they are costly to manage and treat injuries related to falls. Estimates for the medical expenditures on older people's fall are derived using a healthcare methodology that undergoes annual update for expenditure tracking. Attaining this research outcome involves the use of population data from the National Vital Statistics System (NVSS), and the estimates on costs have been derived from web-based injury statistics query and reporting (WSQARS) for reported fatal falls (Tucker et al., 2019). This research was conducted on a population in the United States aged above 65 years. The aging population experiences an increase in the number of falls, thereby posing more concern to the budgetary allocations. These expenditures are bound to increase because the risk factors leading to these falls continue to increase. The survey conducted in 2015 shows the estimated costs of non-fatal and fatal falls approximately $50 billion (Florence et al., 2017). National Medicare expenditure for non-fatal falls amounted to $28.9 billion, while Medicaid spent approximately $8.7 billion. Apart from the government's spending, private individuals also spent a total of $12 billion (Florence et al., 2017). The data relating to healthcare spending states that total spending on falls was estimated to be $ 754 million (Florence et al., 2017). Indeed, the hospitals' analysis of the costs related to falls provides a broad picture of the problem's magnitude.

The higher spending attributed to falls has a massive potential impact on the American people's economy and personal savings—the cost calls for the quick enactment of effective prevention strategies. As the aspect of falls continues to be recognized as a public health problem, it is notable that about 30% of older adults ranging from the age of 65 years fall each year (Tucker et al., 2019). The falls result in serious injuries, thereby resulting in decreased mobility and loss of independence for older people. Indeed, the impact of falls further results in more complications for older people because it results in the resurgence of more complications. With more complications, older people again experience higher risks of falling (Young et al., 2015). Therefore, the expenditure on falls is bound to rise if the preventive strategies are not enacted.

Understanding the actual cost of falls has proven to be elusive because of the many complexities. Significant research works have been conducted, but none has provided a final report on the cost of falls. However, they all agree that the treatment of falls costs both the government and taxpayers a significant amount of money. The methods used in estimating medical costs vary because of the strategies used in identifying falls and injuries. The costs highlighted above are depicted from healthcare (Cary Jr et al., 2018). The practices in the healthcare industry represent different players with varying degrees of resemblance. The many players in the healthcare industry operate where they set their prices. Therefore, many prices are existing for falls in the healthcare industry. The diverse payments have made it difficult to derive accurate reports of the cost of falls amongst the older generation.

International Code for Disease (ICD 9) provides a guideline for the diagnosis of external cause codes (CDC, 2018a). This diagnosis will necessitate uniformity in the industry where the variation of costs will be based on a uniform standard. Another basis for estimating costs non-fatal falls involves the use of data containing comprehensive information on health care spending. The data also has information containing non-fatal falls. The Medicare Current Beneficiaries Survey (MCBS) has information on actual payment to the healthcare providers and hospitals (Zhao et al., 2019). The information contained by MCBS also includes the fees on professional services (Florence et al., 2017). According to MCBS, falls are treated as risks that increase medical spending. However, the mismatch occurs because the cost of falls cannot match the specific healthcare events.

Further analysis on cost of fall related expenditures, provided by partially attributable fraction methods by the CDC (2018b) revealed higher approximations from the counts applied to different states' recommended cost guideline methods. The consideration of costs attained in 2014 shows that total spending on the older generation ranged from $4 billion in California to $48 million in Alaska (Weil, 2015). Medicare spending also amounted to $22 million in Alaska to $3 billion in Florida. The total cost for fall-related injuries in 2014 ranged from $2.8 billion in Florida to $ 68 million in Vermont State (Sumi et al., 2019). Notably, the partially attributable fraction has been accepted to approximate the healthcare systems' costs. The assumption has been applied in calculating income for states with the lowest spending on personal healthcare programs for older people, and the results are as follows. Alaska registered ($48 million), North Dakota ($91 million), Wyoming ($60 million) (Tucker et al., 2019, Young et al., 2015). Similarly, private insurance spending for the older population involved in falls ranged from an estimated $652 million in California to $11 million in Alaska.

The costs of fatal and non-fatal falls in healthcare facilities continue to rise (CDC, 2018b). The CDC has been encouraging medical organizations to invest and engage in medical research and disease prevention, while championing the prevention and reducing of patient falls and cost associated as the top agenda. The CDC estimated the average medical costs for the fatal injuries amounted to $41,570 for the inpatients who spent some time in the hospitals (Schubert, 2020). A cost of $6,880 as charged for an individual in the emergency department. Cumulatively, an approximate number of hospital deaths attributed to injuries is estimated as 50,000 in the fatal injuries while 30,000 dies in the emergency departments (CDC, 2018c). A further survey by the CDC provides an average medical cost for non-fatal medical injuries per person to $6,620. Surprisingly, there are 28 million emergency department visits for non-fatal injuries.

The information from the CDC further states that the economic value of falls and injuries attributed to falls can be ascertained through the loss of productivity, it is estimated that the individual value lost per person is $1,590 (CDC, 2018b). The means that falls and injuries associated with falls deprive the economy of a critical amount of money. Finally, the CDC's recent survey provided an estimate of the medical cost for older adult falls within the United States, amounting to $50 billion on an annual basis

(CDC, 2018b). The cost includes $12 billion expenditure paid by the private insurance agencies and $38 billion settled by Medicaid and Medicare (Weil, 2015). Indeed, the medical burden on the government and American citizens relating to falls is high, and further corrective measures should be enacted to reduce the cost. CDC's information shows that every fall result in an injury is costs at $34,294.

The CDC has highlighted measures targeted towards lowering the economic burden of falls. The initial step is to ensure that preventable falls are avoided at the right time, especially by evaluating patients correctly during admission and making necessary adjustments frequently to align with patient needs. The progressive approach of planning efficient care during admission, doing the right intervention, studying patient changes, and acting upon necessary needs presents the hospital with an opportunity to make the hospitals safe for their habitation. Indeed, CDC reports hold that 90% of falls are preventable for older adults (CDC, 2018a). The systems should be in place to ensure they provide all the required information to the doctors during their visits. Cases of negligence in the medical field that encourage falls can be avoided by establishing essential and efficient practices. The hospital must address the risk factors at the earliest time because this reduces falls by a critical margin. It follows that hospital measures of reducing falls translate into a reduction of the economic burden.

Definitions

Mental status is a comprehensive analysis of a patient's emotional state, intellectual capacity, and general mental health based on a doctor’s observations, which include assessment of mood, behavior, orientation, reality, judgment, memory, and problem-solving ability. Patients with delirium, dementia or psychosis may be agitated or confused, putting them at high risk for falls (HD Nursing, 2019).

Toileting needs involve getting on and off an un-adapted toilet, evacuating the bladder and bowel, and cleaning oneself afterwards. The degree of independence based on un-aided in supervision and assistance level. Incontinence, frequency, or urgency put patients at higher risk to fall (HD Nursing, 2019).

Volume/electrolyte status refers to the level of fluids in the human body. Electrolyte volume status is regulated through the monitoring of systemic solute per unit volume, or osmolarity. Volume and or electrolyte imbalances may cause mental status changes, hypotension, weakness (HD Nursing, 2019).

Communication/sensory visual (glasses)/hearing deficit is a condition where a patient has one of the senses such as sight, hearing, smell, touch, taste, and spatial awareness, is no longer normal. People who wear glasses, hard or healing are examples of impairment. Another example is non-English speaking, patients who are unable to speak or have slurred Speech (HD Nursing, 2019).

Behavioral trait is a person’s conduct and activity as observed. Social behavior may be influenced by depression, anxiety, substance Abuse that might be witnessed sometimes with impulsiveness. Such patients call for close observation and camera monitoring.

Assumptions

Patient falls involving staff assist are subjective, whether they are classified as a fall or patient assist lowered safety by staff. All patient falls, which are safe staff assist, will be classified as actual falls. Most patient falls go unreported (CDC, 2018b). One of the reasons for undocumented falls is staff fear of punishment and responsibility. The researcher assumed that all falls were recorded. Staff were educated about the research and assured that there would be no repercussions for reported patient falls. The researcher assumed that only medical-surgical care patients resided in surgical care wards and there was no overflow of patients from other units that reside in the surgical units.

Scope and Delimitations

Patients suffering from diverse ailments present unique factors that may lead them to have a fall. Medical-surgical patients were selected for this study because they are distinctive in care needs compared to neurological patient care population. In the study, the focus was centered on the medical-surgical patient population only. The researcher assumed that initial data scored at patient admission using the HDS, was available to compare with the outcome data, to certify if there was any miscalled recorded, that subsequently resulted in a patient fall after the HDS was implemented. Preliminary data helped identify positive or negative tending. To address the data issue, the study focused on secondary data as the source. Lack of structured data meant that time would be taken to clean the data to limit the scope only to medical-surgical department. Patients admitted to medical-surgical wards, who were not medical-surgical patients (admitted to the unit as an overflow) were removed from data analysis. Where one independent variable recorded an exceedingly high score, generally, the overall scoring was higher due to the outlier and may be influencing other variables.

The HD Nursing tool study focused on medical-surgical inpatient patient population and was to ascertain if the tool was proficient or needed calibration to suite the inpatient medical-surgical patient population. A sample size of 2000 patient records was used. Based on preliminary observations, there was still a high number of patient fallers in the medical-surgical wards and the HDS needed to be recalibrated to suite the med surge population depending on the findings.

Significance, Summary, and Conclusion

This study was significant in that despite the promotion and use of fall risk assessment tools like the HDS, less research had been conducted on their effectiveness in preventing patient falls, especially in medical-surgical patient population. Even though HDS is widely used in many hospitals in the US as a fall predictive tool across all patient population, the application was first tested on neurological patient population and no literature exists to validate the use of the HDS on medical-surgical population or any other patient population besides the neurological patients. With a scientifically tested and recalibrated HDS, health care providers were able to correctly identify high-risk medical-surgical patient fallers and proactively take necessary measures to ensure patient safety. The cost of healthcare delivery will decrease if patient falls are contained especially on medical-surgical areas, professionally managed, and controlled. Healthcare costs associated with falls will decrease, and reimbursement increases. According to Florence et al. (2018), in 2015, medical costs attributable to both fatal and nonfatal falls were approximately $50.0 billion. For nonfatal falls, the report indicated that Medicare paid approximately $28.9 billion, Medicaid $8.7 billion, and private and other payers $12.0

billion towards patient fall medical expenses. The report further elaborated that, in general, medical spending for fatal falls was estimated to be $754 million. Medicare shoulders about 75% of the more than $50 billion in healthcare costs related to falls. Lin et al. (2017) noted that hospital costs for patients who fall increase by an average of $4,200 over non-fallers.

The Joint Commission emphasizes the need to reduce the injuries sustained from patient falls through its National Patient Safety Goals (The Joint Commission, n.d.). Subsequently, CMS integrated falls as one of its categories under hospital-acquired condition regulations that became effective on October 1, 2008. This directive means that hospitals do not receive reimbursement for treating injuries that result from falls sustained while in the hospital. Lack of reimbursement because of patient falls has adversely limited healthcare organizations the much-needed revenue, while hospitals are supposed to pay for treatment-associated to falls. The Center for Disease Control and Prevention (2020b) indicated that the cost of treating a patient fall average $24,962 for injuries sustained only by a patient falling from the bed. The expenses associated with patient falls are significant and cost containment is crucial to attaining the triple aim in health care. The results of this study could contribute to improved quality of patient care and enhanced decision making by healthcare leaders in adopting the HDS as a fall intervention strategy. Patient falls impact not only the patient but the society as well. Improved patient care and safety will reduce the cost of healthcare delivery because of cost containment and promote quality in healthcare (The Joint Commission, n.d.).

The study on the use of the HDS with a medical-surgical group of patients was to validate precision, application and, use of the instrument to ascertain its validity and effectiveness on the scale level to prevent more patient falls. Use of health information technology safety measurement framework, the EPIC data base and SPSS seamlessly yielded desired analysis. The study outcome validated the HDS on the medical-surgical population and call for similar validation on other patient populations previously not validated. The research offered providers and healthcare leaders a proficient tool to manage and reduce patient falls, improve patient care, and reduce cost associated with patient falls.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative study was to determine the extent to which the overall score on the HDS, medications, volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior predict the occurrence of patient falls in the medical-surgical patient population. In this section, I describe the research design, population, sampling methods, data collection methods, and data analysis plan.

Research Design and Rationale

I applied a quantitative correlational cross-sectional methodology in the study. This approach was appropriate because the results were numerical and could be tested, and secondary data would be used for statistical analysis. The cross-sectional method can ensure that information is captured based on data gathered for a specific point in time, from a pool of participants with varied characteristics and demographics as part of the medical-surgical population. For my planned research design, I used secondary data from a hospital, which were taken from the EPIC medical information record patient fall database. The data were refined to only accommodate the medical-surgical patient population ranging from 2019 to 2020 from the EPIC medical information database with a sample size of 2,000. All patient admissions and records were documented in the EPIC medical information database. Data sets were limited to the medical-surgical care department at the hospital.

Patient scores on the HDS that formed the primary independent variables, as recorded and stored in the EPIC patient records database, included the following: medications and volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior. The dependent variable was a fall or no fall. There were no anticipated time or resource constraints.

Methodology

Population

I examined recorded patient falls from only medical-surgical units at a hospital in Colorado. The data covered a period of 1 year (2020) with medical information records (MIR) from the medical-surgical unit. Medical-surgical nursing is the single largest nursing specialty in the United States and beyond (Academy of Medical-Surgical Nurses, 2019). Medical-surgical units provide care to adults with a multiplicity of medical issues, including those who are preparing for or recovering from surgery. The medical-surgical population is often acutely ill and suffering from several issues, complications, and comorbidities.

Despite the wide application and use of the HDS in the medical-surgical patient population, there is no scientific evidence for its effectiveness and appropriateness with the medical-surgical patient population. The HDS has only been validated in the neurological patient population (HD Nursing, 2019).

Sampling and Sampling Procedures

Data sets necessary for the completion of the research were available from existing records and documents. Documents and records to be used were authentic and verifiable to execute the study. Records from the health institution medical center were readily available in completing the project after IRB approvals. The success of the project relied on the collection of relevant data from the medical fraternity relating to the use of the HDS in medical-surgical wards. The data collected reflected different variables of the HDS that included age, last known fall date, mobility, medications, mental, toileting needs, volume/electrolyte status, communication/sensory, and behavioral, because they all share a similar characteristic—fall. In the study, quota sampling was applied because I used known variables and the research population was localized and known. A quantitative correlational cross-sectional methodology was applied in the study. To analyze the evaluation results, I conducted a power analysis using G*Power 3.1.9.4 software to determine what size sample was needed. Using statistical tests, I looked for evidence that in the study, I could reject the null hypothesis and conclude that the study had an effect. The study power reference referred to the probability that the research test would find a statistically significant difference when such a difference existed. Subsequently, power was the probability that I would reject the null hypothesis when deemed suitable and to avoid Type II error. In the study, it was generally accepted that power should be .8 or greater, meaning that the study would have an 80% or greater chance of finding a statistically significant difference when there was one.

- *t* tests: Correlation—Point biserial model
- Analysis: A priori—Compute required sample size
- Input: Tail(s) = One

  Effect size |ρ| = 0.3

α err prob = 0.05

Power (1-β err prob) = 0.8

- Output: Noncentrality parameter δ = 2.5158836

Critical *t* = 1.6698042

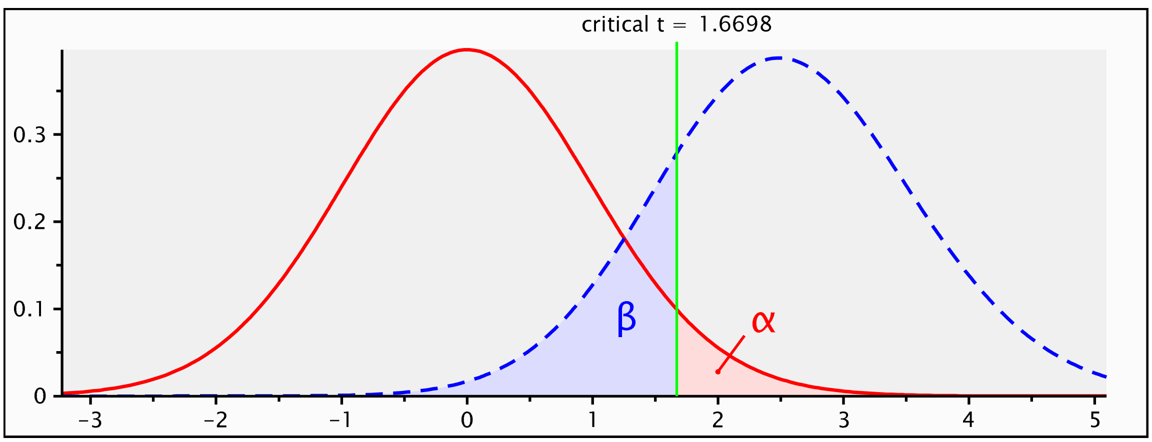
df = 62

Total sample size = 64

Actual power = 0.8005036

Figure 6

Power Test Results



Operationalization of Variables

The HDS includes nine variables (age, last known fall date, mobility, medications, mental, toileting needs, volume/electrolyte status, communication/sensory, and behavioral). The variables are scored on a scale as indicated.

Table 2

HD Nursing Analysis Score Guide

Category/variable	Scale/points	Relationship to falls	Interventions
Age (select one)	< 20 yrs = 0 20–40 yrs = 1 41–60 yrs = 2 > 60 yrs = 3	Among older adults (age 65+), falls are the leading cause of injury related death and the most common cause of nonfatal injuries	Assess for risk of injury and additional risk factors
Last known fall date (select one)	No falls = 0 Within the last year = 1 Within the last 6 months = 2 Within the last month = 3 During the current hospitalization = 4	Patients with recent history of falls (in past 3 months) are at a higher risk to fall	Assess risk of injury and additional fall risk factors
Mobility (select each indicator that applies and total the selection)	No limitations = 0 Dizziness/generalized weakness = 1 Immobilized/requires assist of one person = 2 Use of assistive device/requires assist of two people = 3 Hemiplegic, paraplegia, or quadriplegia = 4	Patients with an altered gait are more likely to fall	Assist with mobility Therapy involvement
Medications (select each indicator that applies and total the selection)	No meds = 0 CV or CNS meds = 1 CV and CNS meds = 2 Diuretics = 3 Chemotherapy in the last month = 4	Can cause sedation, confusion, impaired balance, hypotension, or orthostatic blood pressure changes	Medication review by pharmacy Check and report orthostatic vital signs
Mental status/LOC/ awareness (select each indicator that applies and total the selection)	A, A, Ox3 = 0 Oriented to person and place = 1 Lethargic/oriented to person only = 2 Memory loss/confusion and requires reorienting = 3 Unresponsive/noncompliance with instruction = 4	Patients with delirium, dementia, or psychosis may be agitated or confused, putting them at high risk for falls	Assess patient for delirium Intense supervision (depending on severity): - Near nurse station - Increased rounds - Camera - Bed alarm - PSCA - Restraints?
Toileting needs (select each indicator that applies and total the selection)	No needs = 0 Use of catheters or diversion devices = 1 Use of assistive devices (BSC, bedpan, urinal) = 2 Incontinence = 3 Diarrhea/frequency/urgency = 4	Incontinence, frequency, or urgency put patients at higher risk to fall	Scheduled rounding protocol Proactive toileting
Volume/electrolyte status (select each indicator that applies and total the selection)	No problems = 0 NPO > 24 hrs = 1 Use of IV fluids/tube feeds = 2 Nausea/vomiting = 3 Low blood sugar/electrolyte imbalances = 4	Volume and or electrolyte imbalances may cause mental status changes, hypotension, weakness	Assess orthostatic vital signs Assess for change in condition
Communication/ sensory (select each indicator that applies and total the selection)	No deficits = 0 Visual (glasses)/hearing deficit = 1 Non-English pt/unable to speak/slurred speech = 2 Neuropathy = 3 Blindness or recent visual change = 4		Glasses within reach Fall education using interpretation services

Category/variable	Scale/points	Relationship to falls	Interventions
Behavioral (select each indicator that applies and total the selection)	Appropriate behavior = 0 Depression/anxiety = 1 Behavioral noncompliance with instructions = 2 ETOH/substance abuse = 3 Impulsiveness = 4		Intense supervision (depending on severity): - Near nurse station - Increased rounds - Camera - Bed alarm - PSCA - Restraints?
Total scores	Implement fall protocol for score ≥ 7 Low risk = 7-10 Moderate risk = 11-14 High risk ≥ 15		

When all patient scores are summed up, according to the HDS, patients scoring 15 points and higher on the scale are likely to fall and should be accorded interventions to prevent them from falling (if a patient is scored at 15 points and over in the HDS during admission, the patient is likely to fall). The scale validity was examined to determine whether it was true and applicable to the medical-surgical patient population.

Null hypothesis (Ho): For this hypothesis, patients scored below 14 points on the scale will still fall (False—0).

$H0: \mu <= 14$

H1 hypothesis: A score of 14 and below will not be a fall (True—1). For this hypothesis, all patients scored at 14 points and below will not fall.

$H1: \mu > 14$

The study analyzed recorded patient fall data over the last 1 year to ascertain whether the minimum threshold of high risk set at a score of 14 is effective in positively identifying patient fallers. The number of patients who fell and were not initially predicted to fall was noted. When the cutoff point is high with a high specificity value, sensitivity is lost, and patients at risk of falling may be missed. When the cutoff point is lower, producing a higher sensitivity value, more patients could be mistakenly deemed as high risk as well.

Figure 7

Statistical Analysis Equation

	Had a fall	Did not have a fall
Predicted to fall	A (true positive)	B (false positive)
Not predicted to fall	C (false negative)	D (true negative)

Sensitivity = A/A+C (True positive/True positive + True negative)

Specificity = D/B+D (True negative/False positive + True negative

Negative predictive value = D/C+D (True negative/False negative + True negative)

Sensitivity = A/A+C (True positive/True positive + False negative)

Specificity=D/B+D (True negative/False positive + True negative)

Positive predictive value = A/A+B (True positive/True positive + False positive)

Negative predictive value = D/C+D (True negative/False negative + True negative)

From Table 2 *HD Nursing Analysis Score Guide*, it is noted that patients scored at 15 points on the scale are likely to fall. Patients scoring 11–14 are at moderate risk of falling and should be elevated accordingly as their status changes (on the watch). Patient with scores of 7–10 are nonfallers, and nursing should take normal precautions. From preliminary observation, it has been observed that most fallers still come from the 11–14 category of scores.

Data Analysis Plan

Data on all fall events from medical-surgical care were evaluated retrospectively for the past 1 year using the hospital's variance reporting system. Data analysis histograms and descriptive statistics were calculated using SPSS version 26 software to determine distributions, detect outliers, and consider the need for transformation. The analysis with help determines to what extent the overall score on the HDS predicts the occurrence of patient falls in medical-surgical patients. *T* tests and cross-tabulation with chi-square tests were used to determine which variables differed significantly between fallers and nonfallers. The results from the analyses permitted the detection of individual variables from the original group of variables that have a strong association with fall history. Bivariate analysis was used to identify individual variables that were predictive of falling. I performed a logistic regression analysis using a forward stepwise procedure, with fall history as the dependent variable (0 = no falls, 1 = fall). Sensitivity and specificity in predicting fall status were calculated for a logistic regression model with each of the nine risk factors separately. For the purposes of this study, sensitivity was defined as the percentage of fallers who were correctly classified, and specificity was defined as the percentage of nonfallers who were correctly classified (O'Loughlin et al., 1993). Validation of instruments included establishing both the validity and reliability of the HDS, where validity was defined as the capability of the scale to measure the variance of the variables of the HDS. Reliability refers to the instrument's ability to consistently measure a variable (Jacome et al., 2016).

Threats to Validity

Besides the nine variables that the HDS uses, there are other aspects that may result in a patient fall, such as dizziness or vertigo, depression, impulsivity, and changes in mental status. Intentional patient falls aimed at causing self-harm may result in nurses documenting wrongly the cause of the fall. Patient falls involving staff assist may be subjective, whether they are classified as a fall or patient assist lowered safely by staff to the floor and not considered a fall, presenting a challenge in scoring. All patient falls that were safe staff assist were classified as actual falls. Patients who were not scaled at the time of admission and were not scaled throughout their hospital stay were considered for the study. The transfer of data from EPIC (Medical Information Record Database, 2021) to a spreadsheet and further to a data analysis tool may have compromised the integrity of data. To ensure reliability, an Excel spreadsheet was used with SPSS; these tools complemented each other in data harmonization and transfer.

Ethical Procedures

Approval to conduct this study was obtained from the Denver Health Hospital organization's quality institutional review board (IRB) and the Walden University IRB. I extracted HD Nursing data from the hospital fall records database, and all primary patient identifiers were eliminated (patient names and MIR numbers). Patients who opted not to be accorded fall prevention measures were considered and their decision respected. The medical-surgical care unit is of interest because it has the highest rates of patient falls and fall-related injuries in Denver Health Hospital. The HDS educators educated nursing staff in completing the assessment using in-service training and through evaluating the use of the scale in practice and providing feedback to nurses individually. Patient names were removed/not captured in the study. Data sets were stored in an encrypted drive and only accessible by me and the hospital IRB. Unusable data set from 10 records were destroyed in confidence.

Summary

The study helped offer credibility and suitability of the HDS to be applied in the medical-surgical patient group as a fall predictive tool. The results helped health care providers to make scientifically proven decisions in reducing patient falls. The scientifically proven assessment of the HD Nursing patient fall prediction tool may establish an understanding of whether recalibration interventions are needed to adjust the scale to suite the patient demographic. The study established meaningful clinical heterogeneity to validate the scale on the medical-surgical patient population. The findings may apply to the variable elements influencing the commitment of the target population and providers to establish patient fall preventive measures.

Section 3: Presentation of the Results and Findings Section

Introduction

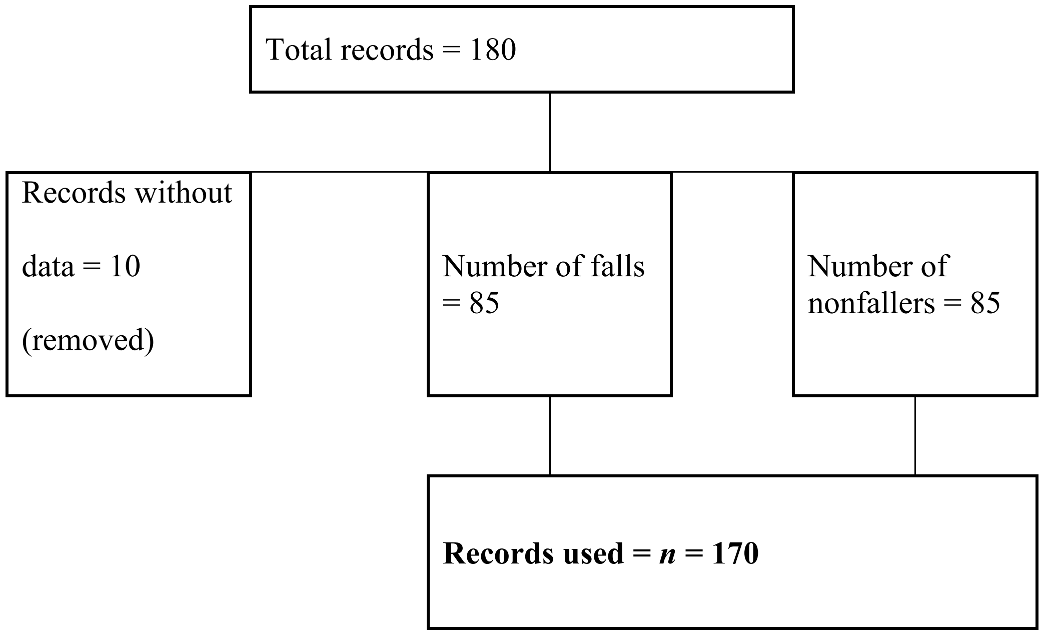
The purpose of this research was to evaluate the effectiveness and accuracy of the HDS in determining fall risk in patients within the medical-surgical patient population. In this section, I review data collection and provide the results of the study.

Data Collection of Secondary Dataset

The study analyzed recorded patient fall data from January 2020 to December 31, 2020, to ascertain whether the minimum threshold of high risk set at a score of 15 is effective in positively identifying patient fallers. The study was conducted with a medical-surgical patient population in four wards in a large healthcare hospital in the United States. The purpose of the study was to examine whether the HDS positively predicts patient falls by determining whether when the scale’s variables are accumulated and the score is over 15, the patient will fall or when the accumulative score is 14 and below the patient will not fall.

Figure 8

Dataset



Descriptive Statistics

The HDS indices are based on patient medications, volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior. The patient is evaluated by the nurse, and variables are scored based on the scale reference as indicated in the patient medical information record. Patients who are scored on a scale of 15 are accorded fall prevention care measures.

Table 3 shows the variables that make up the scale and scoring criteria.

Table 3

HD Nursing Scale

Category/variable	Scale/points
Age	< 20 yrs = 0 20–40 yrs = 1 41–60 yrs = 2 > 60 yrs = 3
Last known fall date	No falls = 0 Within the last year = 1 Within the last 6 months = 2 Within the last month = 3 During the current hospitalization = 4
Mobility	No limitations = 0 Dizziness/generalized weakness = 1 Immobilized/requires assist of one person = 2 Use of assistive device/requires assist of two people = 3 Hemiplegic, paraplegia, or quadriplegia = 4
Medications	No meds = 0 CV or CNS meds = 1 CV and CNS meds = 2 Diuretics = 3 Chemotherapy in the last month = 4
Mental status/LOC/awareness	A, A, Ox3 = 0 Oriented to person and place = 1 Lethargic/oriented to person only = 2 Memory loss/confusion and requires reorienting = 3 Unresponsive/noncompliance with instruction = 4
Toileting needs	No needs = 0 Use of catheters or diversion devices = 1 Use of assistive devices (BSC, bedpan, urinal) = 2 Incontinence = 3 Diarrhea/frequency/urgency = 4
Volume/electrolyte status	No problems = 0 NPO > 24 hrs = 1 Use of IV fluids/tube feeds = 2 Nausea/vomiting = 3 Low blood sugar/electrolyte imbalances = 4
Communication/sensory	No deficits = 0 Visual (glasses)/hearing deficit = 1 Non-English pt/unable to speak/slurred speech = 2 Neuropathy = 3 Blindness or recent visual change = 4
Behavioral	Appropriate behavior = 0 Depression/anxiety = 1 Behavioral noncompliance with instructions = 2 ETOH/substance abuse = 3 Impulsiveness = 4
Total scores	Implement fall protocol for score ≥7 Low risk = 7–10 Moderate risk = 11–14 High risk ≥ 15

Table 4 is a summary of the descriptive statistics from the secondary data used: mean, median, standard deviation, and skewness of the independent variables.

Table 4

Descriptive Statistics

	Age bracket	Last known fall date	Mobility	Medication	Mental status	Toileting needs	Volume of electrolyte status	Communication/ sensory
N valid	170	170	170	170	170	170	170	170
Missing	0	0	0	0	1	0	0	0
Mean	2.25	.48	1.23	2.14	1.19	1.39	1.75	.48
Median	3.00	0.00	1.00	2.00	1.00	1.00	2.00	0.00
Std. deviation	.864	.801	1.044	.919	.999	1.028	1.157	.918
Skewness	-.515	1.931	.476	-.424	.719	.239	-.142	2.142
Std. error of skewness	.186	.186	.186	.186	.186	.186	.186	.186

Results

Data sets were analyzed using SPSS version 22.0.1. Four research questions guided the study.

Research Question 1

Research Question 1: To what extent does the overall score on the Hester Davis Falls Risk Assessment Scale (HDS) predict the occurrence of patient falls in medical-surgical patients?

$H_0 1$: The overall score on the HDS does not predict the occurrence of patient falls in the medical-surgical patient population.

$H_1 1$: The overall score on the HDS does predict the occurrence of patient falls in the medical-surgical patient population.

In the analysis, the following criteria were used to recode:

- High chances of not falling (0–4)
- Medium chances of not falling (5–9)
- Low chances of not falling (10–14)
- Low chances of falling (15–19)
- Medium chances of falling (20–24)
- High chances of falling (25–29)
- Very chances high of falling (30 and above)
- Patient fall is denoted by 1 (i.e., positive) while no fall is denoted by 0 (i.e., negative)
- Patients having an accumulative score of 15 and above will fall and are denoted by 1 (i.e., positive) while those scoring less than 15 will not fall and are denoted by 0 (i.e., negative)

Statistical Analysis

Sensitivity is a true positive (i.e., the accumulative score predicts a positive result, and the reality is also positive). The score predicts the patient to fall and, the patient falls.

Specificity is a true negative (i.e., the accumulative score predicts a negative result, and the reality is also negative). The score predicts the patient not to fall and in reality, the patient does not fall.

Type I error is a false positive (i.e., the accumulative score predicts a positive result, but the reality is negative). The score predicts the patient to fall while in reality, the patient does not fall.

Type II error is a false negative (i.e., the accumulative score predicts a negative result, but the reality is positive). The score predicts the patient not to fall while in reality, the patient falls.

From the accumulative score and reality on patient fall/no fall table 5, I performed a diagnostic test and the results in Tables 6, 7, and 8 were obtained after running the sensitivity and specificity tests.

Table 5

Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	*N*	Percent	*N*	Percent
Accumulative score and* reality on patient fall/no fall	170	100.0%	0	0.0%	170	100.0%

Table 6

*Accumulative Score * Reality on Patient Fall/No Fall Crosstabulation*

			Reality on patient fall/no fall		Total
			Negative	Positive	
Diagnostic test	Negative	Count	70	48	118
		% within reality on patient fall/no fall	82.4%	56.5%	69.4%
	Positive	Count	15	37	52
		% within reality on patient fall/no fall	17.6%	43.5%	30.6%
Total		Count	85	85	170
		% within reality on patient fall/no fall	100.0%	100.0%	100.0%

Findings from diagnostics test in table 6, the sensitivity, specificity, type I error, and type II error values were obtained and are as shown in Table 7 below.

Table 7

Sensitivity, Specificity, and Type I and II Error

Sensitivity	43.5%
Specificity	82.4%
Type I error	17.6%
Type II error	56.5%

Positive predictive value is the probability that subjects with a positive screening test truly have the factors to fall.

Negative predictive value is the probability that subjects with a negative screening test truly do not have the elements to fall.

I performed a diagnostic crosstabulation test on accumulative scoret and the results in Tables 9, 10, and 11 reveal the positive predictive value and negative predictive value.

Table 8

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	*N*	Percent	*N*	Percent
Accumulative score * reality on patient fall/no fall	170	100.0%	0	0.0%	170	100.0%

Table 9

*Accumulative Score * Reality on Patient Fall/No Fall Crosstabulation*

			Reality on patient fall/no fall		Total
			Negative	Positive	
Accumulative score	Negative	Count	70	48	118
		% within accumulative score	59.3%	40.7%	100.0%
		% within reality on patient fall/no fall	82.4%	56.5%	69.4%
	Positive	Count	15	37	52
		% within accumulative score	28.8%	71.2%	100.0%
		% within reality on patient fall/no fall	17.6%	43.5%	30.6%
Total		Count	85	85	170
		% within accumulative score	50.0%	50.0%	100.0%
		% within reality on patient fall/no fall	100.0%	100.0%	100.0%

From the table, the values were as shown in Table 10.

Table 10

Positive and Negative Predictive Value

Positive predictive value	71.2%
Negative predictive value	59.3%

The Youden Index is a measure of a diagnostic test's ability to balance sensitivity (detecting disease) and specificity (detecting health or no disease).

Sensitivity (%) + Specificity (%) – 100% = Youden Index

Running a receiver operating characteristic (ROC) curve, specificity against sensitivity, the results in figure 9 was obtained. Table 11 shows case processing summary and figure 9 shows results that were obtained.

Table 11

Case Processing Summary

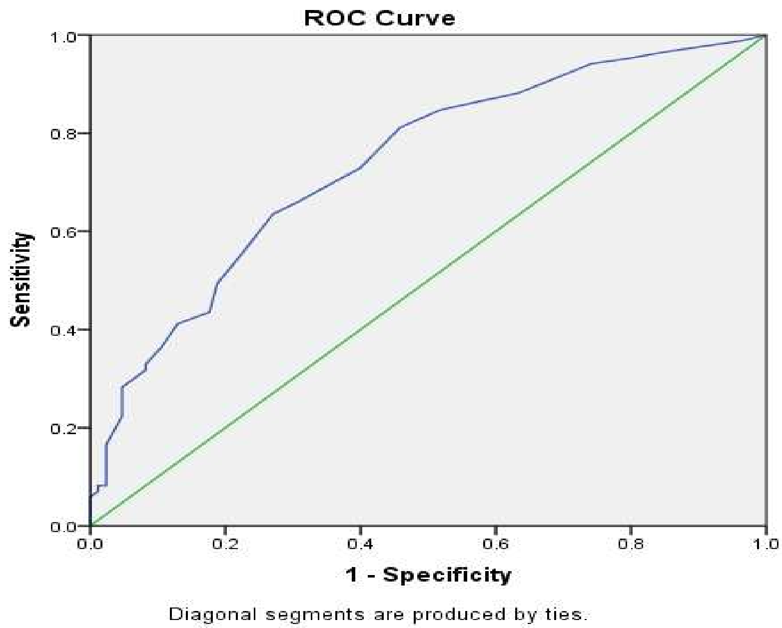
Patients fall or no fall	Valid *N* (listwise)
Positive [a]	85
Negative	85

Note. Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

[a] The positive actual state is 1.

Figure 9

Receiver Operating Characteristic Curve



Area Under the Curve Interpretation

Table 12

Test Result Variable(s): Accumulative Score

Area	Std. error[a]	Asymptotic sig.[b]	Asymptotic 95% confidence interval	
			Lower bound	Upper bound
.737	.038	.000	.663	.812

Note. The test result variable(s): Accumulative score has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

[a] Under the nonparametric assumption. [b] Null hypothesis: True area = 0.5.

Coordinates of the Curve

Test result variable(s): Accumulative score

Table 13

Curve Coordinates

Positive if greater than or equal to [a]	Sensitivity	1 - Specificity
.00	1.000	1.000
1.50	.988	.965
2.50	.976	.906
3.50	.965	.847
4.50	.953	.800
5.50	.941	.741
6.50	.882	.635
7.50	.847	.518
8.50	.812	.459
9.50	.729	.400
10.50	.659	.306
11.50	.635	.271
12.50	.553	.224
13.50	.494	.188
14.50	.435	.176
15.50	.412	.129
16.50	.365	.106
17.50	.329	.082
18.50	.318	.082
19.50	.282	.047
20.50	.224	.047
21.50	.165	.024
22.50	.118	.024
23.50	.082	.024
24.50	.082	.012
25.50	.071	.012
26.50	.059	.000
27.50	.047	.000
31.50	.024	.000
35.50	.012	.000
37.00	.000	.000

Note. The test result variable(s): Accumulative score has at least one tie between the positive actual state group and the negative actual state group.

[a] The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

From table 12 and table 13, the area under the curve is 0.737 hence the Accumulative Score is fair enough to predict patient fall/no fall

Standard error of .038

Asymptotic significance of .000 hence test is statistically significant

Youden index = Sensitivity (%) + Specificity (%) – 100% = Youden Index

43.5(%) + 82.4(%) – 100% = 25.9% (Overall Yoden index)

Table 14

Youden Index of the Points on the Receiver Operating Characteristic Curve

Positive if greater than or equal to [a]	Sensitivity	Specificity	Youden index
0	1	0	0
1.5	0.988	0.035	0.023
2.5	0.976	0.094	0.07
3.5	0.965	0.153	0.118
4.5	0.953	0.2	0.153
5.5	0.941	0.259	0.2
6.5	0.882	0.365	0.247
7.5	0.847	0.482	0.329
8.5	0.812	0.541	0.353
9.5	0.729	0.6	0.329
10.5	0.659	0.694	0.353
11.5	0.635	0.729	0.364
12.5	0.553	0.776	0.329
13.5	0.494	0.812	0.306
14.5	0.435	0.824	0.259
15.5	0.412	0.871	0.283
16.5	0.365	0.894	0.259
17.5	0.329	0.918	0.247
18.5	0.318	0.918	0.236
19.5	0.282	0.953	0.235
20.5	0.224	0.953	0.177
21.5	0.165	0.976	0.141
22.5	0.118	0.976	0.094
23.5	0.082	0.976	0.058
24.5	0.082	0.988	0.07
25.5	0.071	0.988	0.059
26.5	0.059	1	0.059
27.5	0.047	1	0.047
31.5	0.024	1	0.024
35.5	0.012	1	0.012
37	0	1	0

For Research Question 1: I conducted a Chi-square test of independence between the Accumulative Score and patient fall/no fall to determine whether the two variables are dependent or independent of one another. I interpreted the Cramer's V value to determine the strength of the relationship between the two variables.

Table 15

Accumulative Score (Categorical)

		Frequency	Percent	Valid percent	Cumulative percent
Valid	High chances of not falling	21	12.3	12.4	12.4
	Medium chances of not falling	53	31.0	31.2	43.5
	Low chances of not falling	44	25.7	25.9	69.4
	Low chances of falling	24	14.0	14.1	83.5
	Medium chances of falling	20	11.7	11.8	95.3
	High chances of falling	6	3.5	3.5	98.8
	Very high chances of falling	2	1.2	1.2	100.0
	Total	170	99.4	100.0	
Missing	System	1	.6		
Total		171	100.0		

I can therefore proceed to respond research question one by conducting the crosstab and Chi-square test between Accumulative Score (categorical) and patient fall/no fall. The following results were obtained.

Table 16

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	*N*	Percent	*N*	Percent
Acc (14) categorical * patient fall or no fall	170	99.4%	1	0.6%	171	100.0%

Table 17

*Accumulative Score (Categorical) * Patient Fall or No Fall Crosstabulation*

			Patients fall or no fall		Total
			0	1	
Accumulative score categorical	High chances of not falling	Count	17	4	21
		Expected count	10.5	10.5	21.0
	Medium chances of not falling	Count	34	19	53
		Expected count	26.5	26.5	53.0
	Low chances of not falling	Count	19	25	44
		Expected count	22.0	22.0	44.0
	Low chances of falling	Count	11	13	24
		Expected count	12.0	12.0	24.0
	Medium chances of falling	Count	3	17	20
		Expected count	10.0	10.0	20.0
	High chances of falling	Count	1	5	6
		Expected count	3.0	3.0	6.0
	Very high chances of falling	Count	0	2	2
		Expected count	1.0	1.0	2.0
Total		Count	85	85	170
		Expected count	85.0	85.0	170.0

Table 18

Chi-Square Tests

	Value	*df*	Asymp. sig. (2-sided)
Pearson chi-square	27.744 [a]	6	.000
Likelihood ratio	30.454	6	.000
Linear-by-linear association	25.187	1	.000
N of valid cases	170		

[a] Four cells (28.6%) have expected count less than 5. The minimum expected count is 1.00.

Table 19

Symmetric Measures

		Value	Approx. sig.
Nominal by nominal	Phi	.404	.000
	Cramer's V	.404	.000
N of valid cases		170	

[a] Not assuming the null hypothesis. [b] Using the asymptotic standard error assuming the null hypothesis.

Expected count is what I would expect to observe if there is no relationship between the accumulative score and patient fall/no fall. However, there exists a difference between what I would expect to observe and what was observed. The Chi-square test of independence test was used to determine whether the difference is enough for the association to be significant.

Reading the Pearson Chi-square value is 27.744, there are 6 degrees of freedom, and the asymptotic significance is .0 which is less than 0.5 meaning that my result will be statistically significant therefore, I will reject the null hypothesis that the overall score on the HDS does not predict the occurrence of patient falls in medical-surgical patient population.

To determine the strength of the relationship between the Accumulative Score and patient fall/no fall, an interpretation of Cramer's V value was done. The Cramer’s V value is .404 meaning that there is a moderate relationship between the Accumulative Score and patient fall/no fall.

Research Question 2

Research Question 2: Using the Hester Davis Falls Risk Assessment Scale (HDS), does medications and volume/electrolyte status predict the occurrence of patients falls in medical-surgical patients?

$H_0$1: The HDS medications and volume/electrolyte status does not predict the occurrence of patients falls in medical-surgical patients.

$H_1$1: The HDS medications and volume/electrolyte status predict the occurrence of patients falls in medical-surgical patients.

To be able to answer research question two and three I ran a regression analysis between the Dependent variable (Accumulative Score Categorical) and independent variables (medication, volume/electrolyte status, communication/sensory needs, mental status, and behavior).

The following results were obtained.

Table 20

Model Summary

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	.958 [a]	.918	.915	.405

[a] Predictors: (Constant), Select the behavioral indicator that applies, Select the medication indicator that applies, Select the mental status indicator that applies, Select the communication sensory indicator that applies, Select the volume of electrolyte status indicator that applies.

Table 21

Coefficients [a]

Model	Unstandardized coefficients		Standardized coefficients	*t*	Sig.
	B	Std. error	Beta		
(Constant)	.839	.084		10.042	.000
Select the medication indicator that applies	.389	.049	.256	7.875	.000
Select the volume of electrolyte status indicator that applies	.328	.048	.271	6.862	.000

[a] Dependent variable: Accumulative score categorical.

Analysis Summary of Research Question 2

Coefficients of the independent variables were used to make interpretation. A unit increase in one more type of medication resulted to 0.389 unit (No Medication = 0 Central Nervous Medications = 1 CV and Central nervous system Medications = 2 Diuretics = 3 and Chemotherapy in the last month = 4 increase in the Accumulative Score while a unit increase in volume of electrolyte (No problems = 0, Nothing by Mouth NPO>24 hrs. = 1, Use of IV Fluids/Tube Feeds = 2, Nausea/Vomiting = 3, Low Blood Sugar/Electrolyte Imbalances = 4) will result to a 0.328 unit increase in the Accumulative Score. I therefore reject the null hypothesis that medications and volume/electrolytes status does not predict the occurrence of patient falls in medical-surgical patients.

Research Question 3

Research Question 3: Using the Hester Davis Falls Risk Assessment Scale (HDS), does communication/sensory needs, mental status, and behavior predict the occurrence of patients falls in medical-surgical patients?

$H_0 1$: Using the HDS, communication/sensory needs, mental status, and behavior do not predict the occurrence of patients falls in medical-surgical patients.

$H_1 1$: Using the HDS, communication/sensory needs, mental status, and behavior predict the occurrence of patients falls in medical-surgical patients.

Table 22

Coefficients [a]

Model	Unstandardized coefficients		Standardized coefficients	*t*	Sig.
	B	Std. error	Beta		
(Constant)	.839	.084		10.042	.000
Select the mental status indicator that applies	.315	.047	.226	6.705	.000
Select the communication sensory indicator that applies	.278	.055	.184	5.014	.000
Select the behavioral indicator that applies	.240	.048	.201	4.994	.000

[a] Dependent variable: Accumulative score categorical.

Analysis Summary of Research Question 3

Coefficients of the independent variables were used to make interpretation. Every one unit increase in Mental status A, A, Ox3 = 0, Oriented to Person and Place = 1 Lethargic/Oriented to Person Only = 2, Memory Loss/Confusion and Requires Reorienting = 3, Unresponsive/Noncompliance with Instruction = 4 each point increase results to 0.315 unit increase in Accumulative Score while behavior score based on Appropriate behavior = 0, Depression/Anxiety = 1, Behavioral Noncompliance with Instructions = 2, ETOH/Substance Abuse = 3, Impulsiveness = 4 results to 0.240 unit increase in the Accumulative Score. A unit increase in communication/sensory needs in the scale, No Deficits = 0, Visual (glasses)/Hearing Deficit = 1, Non-English Pt/Unable to speak/Slurred Speech = 2, Neuropathy = 3, Blindness or recent visual change = 4 will result to a 0.278 unit increase in the Accumulative Score. Therefore, I reject the null hypothesis that communication/sensory needs, mental status, and behavior predict does not predict patient falls in medical-surgical units.

Research constant variables: Age, last known fall date, mobility, and toileting

Emerging Statistical Tests

Test to Determine Optimal Cutoff Point

To be able to determine the optimal cut off point, I conducted a chi-square cross tabulation analysis, placing the cutoff point at different value i.e., 15, 14, 13 and 12. I then compared the different Cramer's V value. The cutoff point with the highest Cramer's V value will be the optimal one as it will be predicting the strongest relationship between the Accumulative score and patient fall/no fall.

Placing the cutoff point at 15, the researcher obtains the following.

Table 23

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	*N*	Percent	*N*	Percent
Acc (14) categorical * patient fall or no fall	170	99.4%	1	0.6%	171	100.0%

Table 24

*Accumulative (15) Categorical * Patient Fall or No Fall Crosstabulation*

			Patients fall or no fall		Total
			0	1	
Acc (14) categorical	High chances of not falling	Count	17	4	21
		Expected count	10.5	10.5	21.0
	Medium chances of not falling	Count	34	19	53
		Expected count	26.5	26.5	53.0
	Low chances of not falling	Count	19	25	44
		Expected count	22.0	22.0	44.0
	Low chances of falling	Count	11	13	24
		Expected count	12.0	12.0	24.0
	Medium chances of falling	Count	3	17	20
		Expected count	10.0	10.0	20.0
	High chances of falling	Count	1	5	6
		Expected count	3.0	3.0	6.0
	Very high chances of falling	Count	0	2	2
		Expected count	1.0	1.0	2.0
Total		Count	85	85	170
		Expected count	85.0	85.0	170.0

Table 25

Chi-Square Tests

	Value	*df*	Asymp. sig. (2-sided)
Pearson Chi-square	27.744 [a]	6	.000
Likelihood ratio	30.454	6	.000
Linear-by-linear association	25.187	1	.000
N of valid cases	170		

[a] Four cells (28.6%) have expected count less than 5. The minimum expected count is 1.00.

Table 26

Symmetric Measures

		Value	Approx. sig.
Nominal by nominal	Phi	.404	.000
	Cramer's V	.404	.000
N of valid cases		170	

[a] Not assuming the null hypothesis. [b] Using the asymptotic standard error assuming the null hypothesis.

Placing the cutoff at 14, I obtain the following.

Table 27

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	*N*	Percent	*N*	Percent
Acc (13) categorical * patient fall or no fall	170	99.4%	1	0.6%	171	100.0%

Table 28

*Accumulative (14) Categorical * Patient Fall or No Fall Crosstabulation*

			Patients fall or no fall		Total
			0	1	
Acc (13) categorical	High chances of not falling	Count	13	3	16
		Expected count	8.0	8.0	16.0
	Medium chances of not falling	Count	33	13	46
		Expected count	23.0	23.0	46.0
	Low chances of not falling	Count	23	27	50
		Expected count	25.0	25.0	50.0
	Low chances of falling	Count	9	15	24
		Expected count	12.0	12.0	24.0
	Medium chances of falling	Count	5	20	25
		Expected count	12.5	12.5	25.0
	High chances of falling	Count	2	5	7
		Expected count	3.5	3.5	7.0
	Very high chances of falling	Count	0	2	2
		Expected count	1.0	1.0	2.0
Total		Count	85	85	170
		Expected count	85.0	85.0	170.0

Table 29

Chi-Square Tests

	Value	*df*	Asymp. sig. (2-sided)
Pearson chi-square	29.051 [a]	6	.000
Likelihood ratio	31.305	6	.000
Linear-by-linear association	26.429	1	.000
N of valid cases	170		

Note. Four cells (28.6%) have expected count less than 5. The minimum expected count is 1.00.

Table 30

Symmetric Measures

		Value	Approx. sig.
Nominal by nominal	Phi	.413	.000
	Cramer's V	.413	.000
N of valid cases		170	

[a] Not assuming the null hypothesis. [b] Using the asymptotic standard error assuming the null hypothesis.

Placing the cutoff at 13, I obtain the following.

Table 31

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	*N*	Percent	*N*	Percent
Acc (12) categorical * patient fall or no fall	170	99.4%	1	0.6%	171	100.0%

Table 32

*Accumulative (13) Categorical * Patient Fall or No Fall Crosstabulation*

			Patients fall or no fall		Total
			0	1	
Acc (12) categorical	High chances of not falling	Count	8	2	10
		Expected count	5.0	5.0	10.0
	Medium chances of not falling	Count	33	11	44
		Expected count	22.0	22.0	44.0
	Low chances of not falling	Count	25	25	50
		Expected count	25.0	25.0	50.0
	Low chances of falling	Count	12	19	31
		Expected count	15.5	15.5	31.0
	Medium chances of falling	Count	5	18	23
		Expected count	11.5	11.5	23.0
	High chances of falling	Count	2	6	8
		Expected count	4.0	4.0	8.0
	Very high chances of falling	Count	0	4	4
		Expected count	2.0	2.0	4.0
Total		Count	85	85	170
		Expected count	85.0	85.0	170.0

Table 33

Chi-Square Tests

	Value	*df*	Asymp. sig. (2-sided)
Pearson chi-square	29.528[a]	6	.000
Likelihood ratio	32.399	6	.000
Linear-by-linear association	27.481	1	.000
N of valid cases	170		

Note. Four cells (28.6%) have expected count less than 5. The minimum expected count is 2.00.

Table 34

Symmetric Measures

		Value	Approx. sig.
Nominal by nominal	Phi	.417	.000
	Cramer's V	.417	.000
N of valid cases		170	

[a] Not assuming the null hypothesis. [b] Using the asymptotic standard error assuming the null hypothesis.

Placing the cutoff at 12, I obtain the following.

Table 35

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	*N*	Percent	*N*	Percent
Acc (11) categorical * patient fall or no fall	170	99.4%	1	0.6%	171	100.0%

Table 36

*Accumulative (12) Categorical * Patient Fall or No Fall Crosstabulation*

			Patients fall or no fall		Total
			0	1	
Acc (11) categorical	High chances of not falling	Count	3	1	4
		Expected count	2.0	2.0	4.0
	Medium chances of not falling	Count	28	9	37
		Expected count	18.5	18.5	37.0
	Low chances of not falling	Count	31	21	52
		Expected count	26.0	26.0	52.0
	Low chances of falling	Count	14	23	37
		Expected count	18.5	18.5	37.0
	Medium chance of falling	Count	7	17	24
		Expected count	12.0	12.0	24.0
	Hugh chances of falling	Count	2	9	11
		Expected count	5.5	5.5	11.0
	Very high chances of falling	Count	0	5	5
		Expected count	2.5	2.5	5.0
Total		Count	85	85	170
		Expected count	85.0	85.0	170.0

Table 37

Chi-Square Tests

	Value	*df*	Asymp. sig. (2-sided)
Pearson chi-square	28.490[a]	6	.000
Likelihood ratio	31.477	6	.000
Linear-by-linear association	27.372	1	.000
N of valid cases	170		

[a] Four cells (28.6%) have expected count less than 5. The minimum expected count is 2.00.

Table 38

Symmetric Measures

		Value	Approx. sig.
Nominal by nominal	Phi	.409	.000
	Cramer's V	.409	.000
N of valid cases		170	

[a] Not assuming the null hypothesis.

Using the asymptotic standard error assuming the null hypothesis.

Table 39

Cutoff High Point

Cutoff score	Cramer`s V
15	.404
14	.413
13	.417
12	.409

Observation: The cutoff point with the highest Cramer`s V value is 13 i.e., at 0.417.

Summary

Examining data analysis to answer question one, to what extent does the overall score on the HDS predict patient falls in medical-surgical patients? I evaluated data to determine the strength of the relationship between the accumulative score and patient fall/no fall and then interpreted the Cramer's V value. The Cramer's V value is .404, indicating a moderate relationship between the accumulative score and patient fall/no fall. I, therefore, reject the null hypothesis that accumulative variables do not predict patient fall in medical-surgical unit.

Analyzing research question two, using the HDS, do medications and volume/electrolyte status predict patient falls in medical-surgical patients? To answer research question two, I performed a regression analysis between the Dependent variable (Accumulative Score Categorical) and independent variables (medication, volume/electrolyte status, communication/sensory needs, mental status, and behavior). In the analysis summary of the research question, the independent variables' coefficients were applied to interpret. For example, a unit change in medication in the scale where No Meds = 0, CV or CNS Meds = 1, CV and CNS Meds = 2, Diuretics = 3, Chemotherapy in the last month = 4 will result in a 0.389 change in the accumulative score. In comparison, a unit change in volume of electrolytes where in the scale No problems = 0, NPO>24 hrs. = 1, Use of IV Fluids/Tube Feeds = 2, Nausea/Vomiting = 3

Low Blood Sugar/Electrolyte Imbalances = 4 will resulted in a 0.328 change in the Accumulative Score per unit increase. The result was statistically significant. Therefore, I rejected the null hypothesis that medications and volume/electrolytes status do not predict the occurrence of patient fall in medical-surgical patients.

Research question three, using the HDS, does communication/sensory needs, mental status, and behavior predict patient falls in medical-surgical patients? The analysis summary of research questions coefficients of the independent variables was interpreted. Mental status scoring scale A, A, Ox3 = 0, Oriented to Person and Place = 1, Lethargic/Oriented to Person Only = 2, Memory Loss/Confusion and Requires Reorienting = 3 and Unresponsive/Noncompliance with Instruction = 4 each unit increase resulted in a 0.315 change in the accumulative score, while behavior results in a 0.240 change in the accumulative score. A unit change in communication/sensory needs will result in a 0.278 change in the accumulative score. I, therefore, reject the null hypothesis that communication/sensory needs, mental status, and behavior do not predict the occurrence of patient falls in medical-surgical patients.

Significant results from further analysis demonstrated that the accumulative score could be used to predict patient fall/no fall. The difference arose when the researcher used a different cutoff on the strength of the relationship between the two variables. Comparison of the different values of Cramer's V at different cutoff points indicates that the cutoff point with the highest Cramer's V value is 13, i.e., at 0.417. The relationship between Accumulative score and patient fall/no fall is highest at cutoff point 13. Hence, I should lower the cut off from 15 to 13 where all patients scoring 13 points and above should be accorded interventions to prevent them from falling.

Section 4: Application to Professional Practices and Implications to Social Change

Introduction

The social problem addressed by this research was the need to evaluate the effectiveness of the HD Nursing patient fall predictive tool's accuracy in determining fall risk in patients within the medical-surgical patient population. Upon obtaining Walden University and hospital IRB approval, I conducted a systematic analysis of fall data to evaluate the effectiveness and evidence related to fall prevention in the medical-surgical unit in a safety net hospital.

Several studies have revealed that patient falls are devastating, affecting patients' physical, emotional, and financial status (Ambutas et al., 2017). According to Godlock et al. (2016), patient fall injuries can result in emergency surgeries, increased patient hospital stays, and even deaths of patients. Several risk factors have been identified by the HDS, and there is a need for appropriate interventions to be observed and implemented to address the patient fall menace. Healthcare providers can contribute significantly to implementing the HDS, an evidence-based intervention to reduce falls. The approach can be achieved when individual needs are addressed.

The purpose of the study was to evaluate the HDS's appropriateness for application to the medical-surgical patient population and to develop evidence to ascertain the effectiveness of the tool or to recommend changes to the current threshold. The study revealed that variables in the HDS are predictors of patient falls. Further data analysis indicated that the relationship between accumulative score and patient fall/no fall was highest at a cutoff point of 13. Further research is needed to lower the lowest cutoff point for patient falls from 15 to 13.

Interpretation of Findings

The HDS positively predicts patient fallers in the medical-surgical patient population. The revelations of this study showed that the demographic variables age and gender were not risk factors in the study. Instead, patient-related factors were found to increase the risk of falls. Therefore, fall prevention strategies should be linked to the patient characteristics that cause a patient to fall. The results indicate that patient fall strategy should focus on modifiable and influential risk factors such as patient medications, volume/electrolyte status, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior.

Patient falls are among the challenges facing the healthcare system. Every potential patient fall can result in fractures, injuries, or even death. Huang et al. (2017) noted that patient falls result in extra costs for healthcare organizations and patients, prompting healthcare facilities to develop patient fall reduction measures. Research by Weil (2015) indicated that the fall rate for patients ranged between 1.3 to 8.9 for every 1,000 days of patient stays in a hospital. Lin et al. (2017) remarked that patient falls are among the highest hospital-acquired conditions compared to other nosocomial diseases, and whose reimbursement was withdrawn in 2008. CMS (2018) halted the reimbursement program for falls as hospital-acquired conditions to reduce patient injuries and increase patient safety.

The findings have indicated that repeated falls occur at a higher rate in patients with a fall history than in previous nonfallers. My results confirmed an association with the increased risk of falls in patients who had prior falls. Other research indicated that circumstances or characteristics of last falls were repeated in subsequent falls. In a study by Mayo et al. (1993), the findings indicated that this aspect helped in identifying patients at elevated risk of falling; thus, Mayo et al. recommended the inclusion of such factors in the fall risk assessment tools administered during hospital admission.

Patient falls in the hospital adversely affect both younger and older generations. However, members of the older generation have dire impacts when they fall. Observation of multiple studies indicated that many hospital patient falls result in injuries. Campos and Askenas (2019) noted that one in every five falls results in serious injury. These injuries may impact patient movement or result in patient death (Janati et al., 2017). A patient’s fall may break bones such as the arm, ankle, wrist, or hip (Montgomery, 2018). A patient falling may also experience a fatal head injury. Though they might not hurt themselves during the fall, patients who fall may develop fear and tend to avoid daily activities (Janati et al., 2017).

The components of preventing falls are critical, and each should be performed categorically. There is an existing relationship between all the components of fall prevention tools because they share a common factor. The first instance of integrating these tools involves the development of a clinical framework for patient safety. The HDS presents a quality dataset framework that effectively falls under the HIT framework. The HDS is a classification system by which measure scores are used to improve patient safety standards. The HIT conceptual framework was appropriate to synthesize the HDS for its suitability and appropriateness to be applied in the inpatient medical-surgical patient population or establish a need to recalibrate the tool to meet appropriate standards in the given patient population to achieve patient safety. The application could improve patient quality measures based on a proven patient fall reduction tool. Essentially, the HDS aspect as the fall risk assessment tool is to provide vital guidelines as a component toward patient fall prevention programs in the continuum of care. Despite the presence of various risk prediction instruments, the choice of an ideal instrument depends on the reliability of the item. The HDS has been widely used to assess fall risks in all areas of the United States. One thousand nine hundred four patients records in the neuroscience unit were initially used to validate the HDS (Grillo et al., 2019). The HDS was developed to help predict falls occurring in the neuroscience adults patient population and had not been validated in the medical-surgical patient population. The provisions of the HD plan ensure adjustment to cater to the patient's existing condition to prevent fall.

The HDS fall index scale cut of is at 15 points. Meaning, according to the scale, patients scoring 15 points and above are likely to fall. Emerging statistical tests analysis to evaluate the appropriate optimal cutoff point for the medical-surgical patient population, by conducting a chi-square cross-tabulation analysis, and placing the cutoff point at different values (i.e., 15, 14, 13, and 12). I then compared the different Cramer's V values in the study, and I examined the HD Nursing baseline threshold on 15 as the minimum score for fallers. The cutoff score of 15 gave the highest Cramer's V value at .404; a cutoff score of 14 gave the highest Cramer's V value of .413; a cutoff score of 13 gave the highest Cramer's V value of 0.417; and a cutoff score of 12 gave the highest Cramer's V value of 0.409. The cutoff point with the highest Cramer's V value was the optimal one based on the findings. It will predict the most substantial relationship between the accumulative score and patient fall/no fall. The highest cutoff point with the highest Cramer's V value is 13 (i.e., at 0.417).

Limitations of the Study

As the study was conducted in a safety net hospital, there were limitations affecting its generalization. This problem was moderated by selecting a larger study population from four (9A, 8A, 7A, and 6A) medical-surgical wards. The second limitation was the problem of self-reported recall of falls by older patients due to difficulties in speaking in English or by those who were alone, which led to underreporting. Finally, some patients were not scored in the database due to nurses forgetting to do routine work.

Recommendation

The HDS can predict patient falls in the medical-surgical patient population. The relationship between accumulative score and patient fall/no fall is highest at a cutoff point of 13; hence, I should lower the cutoff from 15 to 13. All patients scoring 13 points and above should be accorded interventions to prevent falling. Further research on the relationship between accumulative score and patient fall/no fall highest cutoff point is recommended in other patient populations and patient care setups where the HDS is used. The analysis will ascertain the highest cutoff point to achieve maximum patient safety and prevent patient falls. Reducing patient falls can reduce the cost of healthcare, reduce patient injuries, and improve patient modalities.

Implications for Professional and Social Change

The overall well-being of the patient is achieved—this descriptive concept advocates for patient safety and healing. Evaluating the impact of medications and volume/electrolyte status, age, last known fall date, mobility, toileting needs, communication/sensory needs, mental status, and behavior variables will help in precisely predicting patient fall or no fall, which can help in formulating a care plan aimed at preventing patient falls. Although a fall intervention protocol exists at the medical-surgical care hospital referred to in the study where the HDS is being used, the fall rate remains high. Based on a systematic review of the findings, it is recommended that the hospital establish an interdisciplinary fall prevention team to work with all nurses and the fall team committee. To guide the implementation of an interdisciplinary fall prevention committee, the fall prevention committee can use the Strategies and Tools to Enhance Performance of Patient Safety (STEPP) approach as described by Godlock et al. (2016). The approach can facilitate the identification of risk factors for falls and foster the application of customized prevention strategies.

The fall prevention team will focus on practical completion of the HDS by staff and identification of appropriate interventions to prevent falls in patients found to be at risk. Subsequently, the fall prevention committee will analyze factors related to all falls on medical-surgical units, report findings to staff and managers on the units involved, and then develop interventions to prevent further falls. Established nursing advocates will work on their designated unit to ensure that the fall prevention protocol is being followed appropriately and will help to educate staff as needed. To develop and implement a robust medical-surgical patient fall prevention robust system, patient fall committee members and medical-surgical nurse managers can be asked to appoint members for the interdisciplinary fall prevention team. Team members should receive training based on the evidence and should be able to demonstrate learning.

Similarly, unit-based fall advocates could be selected by nurse managers and undergo training. Once the significant participants are trained, the project can be introduced to the units, and staff can also undergo training. All falls must be reported and documented in a database system for easy data retrieval. Improvement based on the Plan Do Study Act (PDSA) model in fall preintervention should be applied where pre activation data is collected and compared with postintervention to ensure continuous improvement. Reduction of patient falls can ensure healthy lives, safety, and reduced cost of care.

Conclusion

Falls on medical-surgical wards in hospitals are preventable, yet evidence has shown that falls occur in this setting. Researchers have identified several fall prevention strategies such as staff education, identification of risks for falls, and use of fall risk assessment tools that can reduce fall rates if appropriately implemented. Although studies in this area are limited, findings have shown convincing evidence that fall prevention strategies effectively reduce falls. The study findings demonstrated that the overall HDS positively predicts patient falls in the medical-surgical group of patients. There is a need for continued research and the development of nationally standardized guidelines for fall prevention to foster social change for patients, staff members, and health care organizations. Further study of interventions to prevent patient falls should be considered, such as assigning and using bed alarms during patient admission, making gait belts accessible at bedside, and placing personal items within reach.

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Appendix

Measuring and improving patient safety through health information technology: The Health IT Safety Framework

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